COMBATING DIAMOND THEFT THROUGH INTELLIGENCE-LED AND TECHNOLOGY-BASED SOLUTIONS: CASE STUDY CULLINAN DIAMOND MINE, SOUTH AFRICA

By

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DECLARATION FORM

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(Mr MD Nek)

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LIST OF ABBREVIATIONS

ABBREVIATION	DISCRIPTION
DEV	Diamond Value Chain
CDM	Cullinan Diamond Mine
SAPS	South African Police Service
PRISA	Private Regulatory Industry Security Authority
PDSA	Petra Diamonds Southern Africa
CIA	Central Intelligence Agency
SINGT	Signals intelligence
MINT	Imagery intelligence
MASINT	Measurement and signature
MUMINT	Human intelligence
GEOTINT	Geospatial intelligence
OSINT	Open-Source intelligence
HR	Human Recourse
FDM	Finsch Diamond Mine
FDM	Koffiefontein Diamond Mine
GDP	Growth Domestic Product
CCTV	Close Circuit Television
SM	Security Manager

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CHAPTER 1
INTRODUCTION AND RESEARCH RATIONALE

1.1 INTRODUCTION

In 2003 De Beers Group released a statement stating that diamond theft was threatening the future of Premier Mine in Cullinan (Cullinan Diamond Mine currently owned by Petra Diamonds Southern Africa PDSA). The statement by De Beers followed an arrest of two employees and nine non-employees made by the South African Police Service during an operation in the area of Cullinan. The company further noted that theft of diamonds at its operation could have negative effects on the company, employees and surrounding communities (Anon., 2003: np).

This research study focuses on diamond theft at Cullinan Diamond Mine (CDM) and the use of intelligence-led and technological solutions to prevent diamond theft. Since July 2008, when it was purchased from De Beers, Cullinan Diamond Mine (Pty) Ltd has been owned by Petra Diamonds Southern Africa (Pty) Ltd. Cullinan Diamond Mine is situated in Gauteng, 35 kilometres north-east of Pretoria near the town of Cullinan. Although Cullinan Diamond Mine have measures in place to prevent diamond theft, the challenge remains to either reduce or combat it. Petra Diamonds also has other diamond mine operations in South Africa and therefore the research findings and recommendations of the study could also be implemented at their other mining operations in order to prevent diamond theft.

This research study aimed to determine risks and vulnerabilities throughout the diamond value chain that could result in the theft of diamonds. The diamond value chain process has various stages which includes sizing, washing and separation through various systems in order to recover the diamonds. Throughout these various stages of the diamond value chain, processes of human element are present, which include monitoring and maintenance to ensure efficiency of all these processes. This study also aims to determine if intelligence-led and technology solutions could assist in preventing diamond theft. Such theft of diamonds could have a serious impact on the continued existence of the company.

Ndlovu (2012: 323) highlights the challenges of diamond theft within the diamond industry in South Africa by pointing out that the South African diamond industry was given an opportunity to reflect on illegal diamond buying and other challenges. Illegal diamond buying involves the buying of diamonds from the black market which is illegal. Part of the reflection by the diamond industry was the perception that some of the South African Police Service (SAPS) members have become part of the problem of illegal diamond buying. Illegal buying of diamonds from the black market has a negative impact on the government in terms of revenue, community continued employment and the survival of Cullinan Diamond Mine.

Trade in diamonds could be used both in genuine trade in business within legal means and criminal means. The non-governmental organisations, Global Witness and Partnership Africa Canada, warned that illicit trade in rough diamonds is one of the threats facing the Kimberley Process which was created to prevent illicit trade in diamonds which has cost so many lives over the last two decades (Reliefweb, 2008: 1.

Petra Diamonds produced 743 424 carats of diamonds during the third quarter of 2014 and this represented a year-on-year increase of 15 percent. The company further indicated that Petra Diamonds recorded a 36 percent increase in rough diamond sales volume for the third quarter having sold 905 781 carats for a revenue 163.9 million US dollars (Anon., 2014: np).

The State Diamond Trader is mandated to promote equitable access to benefit local diamond resources of South Africa and fully committed to a high standard of governance. During the period 2012-2013 the State Diamond Trader inspected a total of 7117 642 carats to the value of 1177 840 751 US dollars from diamond mining operations in South Africa. The above reflected figures account for about 90 percent of the country's total diamond production. This serves to illustrate the importance of the industry and the necessity to prevent diamonds from being stolen and entering the black market (State Diamond Trader, 2013: 1)

In the light of the threat of diamond theft at Cullinan Diamond Mine and other diamond mines, there is an obvious need for Petra Diamonds to have security measures in

place in order to ensure that investors get their return on capital and ensure profits are made. Furthermore, that the company does not become a source of diamonds to the illegal diamond buying trade. The researcher's aim with the study is to contribute to the process of preventing diamonds from being stolen and entering the black market.

Diamond theft is a long-standing challenge for the diamond industry that has not yet been adequately addressed, particularly considering the value generated from the sale of diamonds. The value generated from the sale of diamonds also has a significant impact on the South African economy through tax revenue and is beneficial to communities living in the immediate areas where diamond mine operations are situated.

In the light of the threat of diamond theft at Cullinan Diamond Mine and other diamond mines, there is an obvious need for Petra Diamonds to have security measures in place in order to ensure that investors get their return on capital and ensure profits are made. Furthermore, that the company does not become a source of diamonds to the illegal diamond buying trade. The researcher's aim with the study is to contribute to the process of preventing diamonds from being stolen and entering the black market.

1.2 PROBLEM STATEMENT

Cullinan Diamond Mine experiences diamond theft, with losses running into millions of Rand. The value of the diamonds stolen is dependent on the following characteristics of a diamond: clarity, cut, carat and colour. In addressing the challenge of diamond theft at Cullinan Diamond Mine police projects, police traps and internal security operations have been conducted between 2003-2014. A total of 46 individuals were arrested through police actions, five of whom were permanent mine employees and three contract workers on the mine, while thirty-eight were not employees of the mine. The recovered diamonds during the police actions were seized by the police for evidential purposes. The seized diamonds were evaluated by the police to determine the value, which was R241 791 SAPS CAS 51-02-2006 and SAPS CAS 52/02/2006 Cullinan police station.

Some of the convicted employees were given eight years in jail and some given suspended sentences by the court CAS SAPS 47/04/2008 Cullinan Police Station. At

Cullinan Diamond Mine, although not known, it is suspected that more employees could be involved in diamond theft. The continuous police actions administered at Cullinan Diamond Mine and around the mine is an indication that diamond theft is a problem at the mine. There is a continuous close working relationship with the police to address diamond theft at Cullinan Diamond Mine. The Security Department at Cullinan Diamond Mine conducts internal security actions to combat diamond theft on the mine.

Cullinan Diamond Mine states that the mine produces quality and high-value diamonds. The mine also indicates that it is implementing an expansion plan at Cullinan Diamond Mine which will take its current output from 870 000 carats in FY 2013 to 2.2 million by 2019. It can therefore be expected that the company needs a return on the capital invested from the expansion. The return on investment could only be realised if the diamonds to be produced are protected (Cullinan Diamond Mine, nd: 1)

Diamond theft impacts negatively on the mine's revenue which in turn would have an impact on the future viability of the company. The local community where the mine is situated depends on the mine for employment and this includes local economic activities. The government also depends on the revenue generated through tax to sustain its programmes in the country. If revenue loss in the diamond industry continues at such levels, would translate into less mining tax for the government to use for the implementation and funding of social upliftment and development programmes – as promised over the years to South Africans by the government.

1.3 IMPORTANCE OF THE RESEARCH

Diamond theft has the potential to impact significantly and negatively on the financial performance of diamond mine companies, as it also deprives government, communities and employees of important revenue from diamonds that would otherwise support development in diamond-producing countries (Anon., 2003: np).

The research from this study, will assist companies in combating illegal diamond trade and will support the Kimberley Process Certification Scheme, established in 2000 and

implemented in 2003, which aims to eliminate conflict diamonds from the legitimate diamond supply chain (Smillie, 2005: 1).

1.4 RESEARCH AIMS

According to De Vos, Strydom, Fouché and Delport (2016: 108) the researcher must explicitly state the focus of the study and articulate the specific problems he or she wishes to investigate. This research study focuses on diamond theft which takes place at Cullinan Diamond Mine and the use of intelligence-led and technological-based solutions to prevent diamond theft

The aim of this research is to investigate how an intelligence-led and technology-based approach could assist in preventing and combating diamond theft at Cullinan Diamond Mine. This research is also aimed at making recommendations on how to prevent diamond theft and collect new information on risks in the different processes of the Diamond Value Chain (DVC).

In this study the researcher aims to suggest intelligence-led and technological-based solution measures to assist in the prevention of diamond theft.

The purpose of the study is to establish whether intelligence-led and technological-based solutions could assist in preventing and combating diamond theft at Cullinan Diamond Mine.

The research study aims to determine risks and vulnerabilities throughout the diamond value chain that could result in the theft of diamonds. The researcher also aims to collect new information on risks in the different processes of the Diamond Value Chain.

The researcher's aim with the study is to contribute to the process of preventing diamonds from being stolen and entering the black market.

The research is aimed at making recommendations on how to prevent diamond theft. The research is also aimed at contributing to other government bodies and non-government bodies whose objectives are to combat diamond theft.

The researcher also set out to determine how and what processes are used in converting information into intelligence and whether information on suspicious activities collected from different stages of the Diamond Value Chain and processed into intelligence could assist security managers in preventing diamonds theft at mines. Intelligence is valuable only if it can be shared with consumers who need it. Sharing too much intelligence could lead to the intelligence product being compromised (Thomas & King, 2012: 2).

1.5 RESEARCH OBJECTIVES

Withrow (2016: 25-26) states that research objectives are specific accomplishments which the researcher wishes to achieve through the study.

The researcher's objective is to establish how the use of informers at Cullinan Diamond Mine has assisted the Security Department in combating diamond theft on mine.

The objective of the researcher is also to contribute to the increased revenue to Cullinan Diamond Mine, through better security measures and reduce the risk of diamond theft.

Researcher is to determine how Intelligence and technological solutions could assist the Security Department at Cullinan Diamond Mine to combat diamond theft.

1.6 RESEARCH QUESTIONS

The researcher has selected the questions in such a manner that they speak to the aims and objectives of the research during the investigation:

- How the use of informers has contributed to combating diamond theft at Cullinan Diamond Mine;

- Establish how the diamond value chain has contributed to the challenge of diamond theft at Cullinan Diamond Mine;

- Determine how Intelligence and technological solutions could assist the Security Department at Cullinan Diamond Mine to combat diamond theft;

- Contribute to the increased revenue at Cullinan Diamond Mine, through better security measures aimed at reducing the risk of diamond theft; and

- Contributing to other government bodies and non-government bodies such as the Kimberley Certification Process whose objectives are to combat diamond theft.

According to Gast (2010: 70), “the function of a research question is to focus the investigator on the purpose or goal of the study”.

Research questions formulated for this study are the following:

- What value is derived from the use of informers in preventing diamond theft?

- What is the value of intelligence received in preventing diamond theft?

- What are the risks or vulnerabilities throughout the Diamond Value Chain?

- What Intelligence processes or systems are implemented by the Security Department to prevent and combat diamond theft?

- What trends have been identified in relation to diamond theft on the mine?

- What security measures are in place to prevent diamond thefts during the various stages of the production process on the mine?

1.7 KEY THEORETICAL CONCEPTS

Information

This is material which is unevaluated which derives from rumours, imagery, reports, observation and other sources which has no material value for decision making. Information is the material through which intelligence is produced (George & Kline, 2006: 17)

Intelligence

This is a product which has been collected and analysed both secretly, overtly and used to understand a particular situation and take advantage of it. Intelligence is a product which informs decision making (Rolington, 2013: 17). At Cullinan Diamond Mine intelligence could be used to gather information on risks, vulnerabilities and identify employees who are involved or could be involved in theft of diamonds.

The Intelligence Cycle

The intelligence cycle is a circle of links which represent a set of sequential and repeated steps which includes collection of relevant data, evaluating data for accuracy, analysing and dissemination (Phythian, 2013:1)

Target-centric Approach Process

Target-Centric Approach Process is an alternative to the traditional intelligence cycle in that is involves all role-players including the customer for the intelligence required Clark (2010:13).

Intelligence analysis

Intelligence analysis is a process which involved the interpretation of information about the adversaries or environment for the purpose of decision-making Marrin (2011:1).

Illegal Diamond Buying

This term refers to an act by any person which involves buying unpolished or uncut diamonds outside of the Diamond Act which includes possession, sale, purchase and dealing (Diamond Act No. 30 of 2005).

Risk

This is considered to be an event or act which could have a significant negative impact on an organisation or individual which results in a deviation from the expected outcome (Hopkin, 2018: 15).

Security Risk Management

This is a fundamental premise, essential for any individual, organisation and community using wider risk management activities which take the position that there is no such thing such as a perfect security. Security risk management involves making trades offs as an organisation or individual in deciding whether the organisation or individual is willing to accept the risk exposure to accident or loss (Talbot & Jakeman, 2009: 39-40).

Security measures

Refers to actions taken by organisations or individuals both hardware and deployment of personnel in order to prevent, eliminate or reduce risk exposure or vulnerability to company assets or individual safety (Vellani, 2007: 170).

Kimberlite

Kimberlite is diamond-bearing ore material extracted from a diamond mine. The kimberlite is first hoisted to the surface through skips (a metal bin used to hoist kimberlite material from underground to the surface). This material undergoes various processes in the surface plants. Thereafter, it must be washed first and further crushed to reduce the mined ore into smaller sizes for the diamonds to be separated from the crushed material (Lincoln, 2011: 19). The Kimberlite mined at Cullinan Diamond Mine is a diamond-bearing rock (ore) (Lincoln, 2011: 19).

Diamondiferous material

Refers to any gravel potentially containing diamond (CDM-SEC-29, 2009: 4)

Spillage

Defined as any diamondiferous gravel, kimberlite or blue ground that spilled out of production process streams.

Chokes and blockages

Defined as anything that causes a narrowing in pipes or chutes, which leads to diamondiferous gravel not being able to pass through such pipe or chute freely. While blocked refers to an event in which a pipe of a system or opening in a diamond value chain gets blocked by big rocks or overfeeding material.

Sources or informer

According to Phynthian (2013:2) there are 6 sources of information according to the CIA which is Signals intelligence (SINGT), Imagery intelligence (MINT), Measurement and signature intelligence (MASINT), Human intelligence (HUMINT), Geospatial intelligence (GEOINT) and Open-Source Intelligence (OSINT).

Human intelligence (HUMINT)

According to Phynthian (2013:2) Human intelligence (HUMINT) is derived from human source. In this regard collection includes clandestine acquisition of information such as photographs, documents and other material. This method of information collection by human sources also includes overt collection of information in particular positions which are of interest to intelligence gathering

1.8 LAYOUT OF DISSERTATION

Chapter 1: Introduction and research rationale

This chapter gives an overview of the problem statement, rationale, value of the research and the layout of the dissertation.

Chapter 2: Research methodology

This chapter reviews the methods undertaken by the researcher in dealing with both primary and secondary collection methods of data and analysis. Sampling methods and collection of information in the field and the problems encountered are also dealt with in this chapter.

Chapter 3: Overview of diamond theft and literature review

This chapter reviews existing literature studies on the selected topic chosen

by the researcher for the purpose of locating relevant information for the research study and to incorporate other authors' points of view on the subject matter.

Chapter 4: Interpretation, discussion and research findings

The chapter presents the result of the research findings, interpretation and the analysis of the data collected.

Chapter 5: Recommendations and conclusions

The chapter provides a summary of the aims of the research in relation to the findings. The chapter also deals with the recommendations of available security measures which could assist in the prevention and combating of diamond theft at Cullinan Diamond Mine. Lastly the chapter outlines recommended future research which may emanate from this study.

CHAPTER 2
RESEARCH METHODOLOGY

2.1 INTRODUCTION

The various steps undertaken by the researcher during this study are discussed in this chapter. These steps include identifying the sections at Cullinan Diamond Mine within the Diamond Value Chain from which information for the purpose of this study was collected. The researcher first visited the underground environment of Cullinan Diamond Mine from which the Kimberlite material is extracted transported to the surface area and then later treated through various processes before recovering diamonds. This was followed by a visit to the different plants on the surface, including the final recovery process, for the researcher to acquaint himself with the environment. These activities further assisted the researcher in identifying participants who would have the knowledge to provide information relevant to this study.

During the visit to the above different sections of the Diamond Value Chain at Cullinan Diamond Mine, the section foreman in charge who would both be familiar with safety procedures and all the different processes within the section, assisted in facilitating the visit. The steps undertaken by the researcher further included the selection of participants for the purpose of the research. According to Welman, Kruger and Mitchell (2005: 2), research methodology assists in explaining the logic behind the research methods and techniques used by the researcher to collect information/data.

2.2 RESEARCH DESIGN

The research design is a fundamental plan which guides the researcher in conducting the research. In this research study the researcher aims to first start with the on-site observation to ensure that the researcher is familiar with the different stages of the diamonds value chain. Familiarising the research with the environment of the diamond value chain will ensure that the researcher relates to the responses which will be provided by the respondents.

A qualitative research design was the primary research approach using one-on-one interviews combined with collected onsite observation information. Data gleaned from

case docket analysis was used to contextualise the qualitative interviews responses that were analysed and interpreted.

2.3 RESEARCH APPROACH

In order to ensure that the researcher collected data relevant for the purpose of the selected topic, a qualitative research method was chosen. Qualitative research investigates the relationships, activities, situation or material (Gast, 2010: 10).

In this study the researcher selected employees within the diamond value chain with over ten years working experience. The employees working experience gives them a better understanding of the risk involved in the diamond value chain. The employees would also have a better knowledge of processes which possess a security risk due to engineering design which result in spillage of kimberlite material in the diamond value chain. This experience the employees in the diamond value chain will allow the researcher to gain a better understanding because the assumption is that after 10 years working experience you are knowledgeable.

The unit of analysis in the security departments will also add value to the study with the experienced gained over the years at different levels.

The information gained during interviews with the unit of analysis involved in the diamond value chain will allow the researcher to compare cases investigated against the information of risks identified in the diamond value chain.

The unit of analysis selected has both the feel and experience with 10 years in the system which makes them good sources of information. Interviewing is a way of understanding the experience of other people and the meaning they attach to their experience (Lutz & Knox, 2014: 343.

2.4 RESEARCH METHODS

The researcher used various research method steps to collect data for the purpose of the study, inter alia field work (onsite observation), one-on-one interviews and internal case docket perusal to collect the requisite research information and data for this study.

2.4.1 Data collection methods and field work activities

Data collection methods must be carefully selected to ensure that the method selected provides the data relevant to the question (Friesen, 2010: 80). A schedule of interview questions (Annexure E) was used during the interviews with the relevant participants chosen from the Cullinan Diamond Mine (and subsequently additional participants were selected from the: Finsch Diamond Mine, Kimberley and the Ekapa Mining JV, both operations located in the Northern Cape Province, South Africa and Koffiefontein Diamond Mine, located in the province of Free State.

Questions for the purpose of the interview were formulated to prompt the participants to provide data relevant to the foci of this study. The questions covered technical challenge experience in the Diamond Value Chain which impacts negatively on the protection of diamonds, security measures implemented to prevent diamond theft and security policies and procedures applicable to the Diamond Value Chain. During these interviews hand-written notes were done by the researcher, while the interviews (with permission) were audio recorded. These were later transcribed.

2.4.2 Population and sampling procedure

For the purpose of the study the researcher selected purposive sampling. According to Welman, Kruger, Mitchell (2005:69) purposive sampling the researcher relied on the experience of the unit of analysis and previous research findings. This technique is also called judgemental sampling (De Vos et al, 2011: 232; Rubin & Babbie, 2005: 247).

In this study the researcher selected employees both male and female from the diamond value chain with over 10yrs working experience within the diamond value chain. The researcher requested the Human resource department (HR) to provide the researcher with a list of names of employees from the company system who have over 10 years working experience within different stages of the diamond value chain. A total of 40 names where received from the HR department. To ensure that the unit of analysis selected add value to the study the researcher targeted employees in particular positions. The purpose of targeting particular positions throughout the diamond value chain it was to make sure that the information received covers the diamond value chain from the initial stage of mining to the final stage of diamond

recovery within the diamond value chain. The unit of target included both male and female employees on the list received who are at different positions throughout the diamond value chain. The position targeted included security managers (SM), security officers, plant personnel, mining personnel and senior managers within the Diamond Value Chain and these names were randomly drawn from the box. The researcher selected 20 employees from Cullinan Diamond Mine to be part of the study. The selected employees where first approach to establish if they would be interested to be part of the study and all agreed.

The researcher as part of the study also wanted to establish whether other Petra Diamonds operations had the same challenges of diamond theft as a result the researcher included 3 other operation owned by Petra Diamond which includes. In ensuring that the researcher obtained balanced views and opinions of the data provided, the researcher selected an additional four (4) participants from Finsch Diamond Mine. At Kimberley Ekapa Mining JV the researcher selected four (4) participants and at Koffiefontein Diamond Mine two (2) participants.

The three operations vary in terms of sizes with Finsch Diamond Mine (FDM) being the biggest followed by Kimberley Ekapa Mining JV and lastly Koffiefontein being the smallest operation and this influence the numbers selected of the participants. The same selection process was used like in Cullinan but the difference in this regard, was the human resources departments at these operations were requested to provide the researcher with eight employees per operation with over ten-years' working experience within the diamond value chain. The selected unit of analysis at these operations included employees from the security department, surface and underground. According to Hackett (2016: 35), sampling is a process in which data gets selected from a known population of available data source.

Table 2.1: Respondents' years of service in the Diamond Value Chain

1yr-10yrs	10yrs-20yrs	20yrs-30yrs	30yrs-40yrs
6	17	5	2

The unit of analysis years of service within the diamond value chain varied as per the table able. Six (6) of my unit of analysis had 10 years working experience in the diamond value chain. Seventeen (17) had between 10-20yrs working experience, 5 of my unit of analysis had 20-30yrs working experience and 2 had between 30-40yrs working experience within the diamond value chain. The unit of analysis provided a balance experience for the purpose of the study.

Table 2.2: Respondents' age group

20yrs-30yrs	30yrs-50yrs	50yrs-60yrs	60yrs-70yrs
4	11	10	5

The age group of respondents also provided a very balanced view to the study with the biggest number of 15 coming from the age group between 50-70 years. From the total respondents selected four were females and 26 males.

The schedule of interview questions used for the additional ten interviews were the same as those used in the interviews with the participants from the Cullinan Diamond Mine, in order to ensure that the data collected was balanced and accurate.

The same process of selecting participants at other Petra Diamonds mine operations was followed. The sample was chosen without bias to the targeted population.

A written letter of permission to undertake the research was granted by the general manager at Cullinan Diamond Mine and the group security intelligence manager before the interviews could be conducted (Annexure B).

The researcher protected the identity of the participants by referring to them as Participant 1, Participant 2 up to Participant 30.

2.4.3 One-on-one interviews

One-on-one Interviews are a predominant method of collecting information and the social relation is designed to exchange information between participants and the

researcher's thoughts and experience (De Vos et al, 2016: 342). The questions for the purpose of the interviews were of such a nature that they prompted the participants to give an account of their personal experiences within the Diamond Value Chain, which were relevant to the risks, technical challenges and security measures applicable to the Diamond Value Chain and aimed at protecting diamond theft. The number of questions formulated and posed to the participants varied in accordance to the stage of involvement in the diamond value chain. The number of questions posed to each participant was therefore formed by the nature of the job/work position occupied by a specific participant and the data targeted for collection. In other words certain of the interview questions were skipped depending on their work position in the diamond value chain.

The researcher interviewed a total of 30 participants for the purpose of this study. The sample included participants from the security department, mining and surface. The researcher selected 20 participants from Cullinan Diamond Mine for the purpose of the selected topic. In order to compare responses both on security measures, security risks and technical challenges experienced within the Diamond Value Chain, the researcher selected ten more participants from other Petra Diamonds operations in South Africa. These diamond mine operations include Finsch Diamond Mine (FDM), Kimberley Ekapa Mining JV (FDM), both operations located in the Northern Cape Province, South Africa and Koffiefontein Diamond Mine (FDM), located in the province of Free State.

During this study the researcher used a schedule of interview questions, utilising both closed and open-ended questions in order to source information from the participants (interviewees). The interview questions used, prompted participants to answer 'yes' or 'no' and the other questions prompted the participants to use their experience or knowledge within the Diamond Value Chain at Cullinan Diamond Mine to provide additional more detailed responses. The purpose of this method was to allow the researcher to explore and ask clarifying questions during the interviews, in order to better understand the risks at the different stages of the Diamond Value Chain. The participants in this study were employed in the security environment, underground in the mine, as well as at the plant and final recovery processes above ground at Cullinan

Diamond Mine. This allowed the researcher to understand both the security measures implemented and the risks within the Diamond Value Chain.

The responses from the participants were recorded both in audio and hand-written notes in order to allow the researcher to refer back to the audio or notes during the analysis of the data collected.

Merriam (2009: 89) defines interviews as including a mixed-structured interview schedule of questions which prompts specific data responses from the participants. De Vos et al (2016: 351), states that a schedule of interview questions is used to gain a detailed picture of the participants' experiences, perceptions and account on a particular topic, which was one of the reasons for choosing this method for this specific research study.

2.4.4 Internal case docket review

For the purpose of the study the researcher selected and reviewed only diamond theft case dockets investigated at Cullinan Diamond Mine from 2003-2014. In this regard the researcher deliberately selected 200 diamond theft cases investigated as a result of information received from intelligence at Cullinan Diamond Mine. The purpose of selecting these cases was primarily to determine the value of informers in combating diamond theft at Cullinan as per the objectives of the study. The total of diamond theft cases recorded were 396 which excluded 3 604 other cases, the latter included recorded cases of copper theft, general theft and theft of other company equipment.

During the review of the cases recorded and investigated the researcher made handwritten notes of the following from the case dockets:

- How the information which led to the cases investigated came to the attention of the Security Department

- Employees identified through intelligence to be involved in illicit diamond trade

- Arrested employees for being involved in illicit diamond trade

- Employees dismissed through internal disciplinary procedures for being involved in illicit diamond trade

- Contract employees identified through intelligence to be involved in illicit diamond trade

- Arrested contract employees for being involved in illicit diamond trade

- Contract employees dismissed from the mine for being involved in illicit diamond trade

- Value of the diamond recovered during arrests made

- Loss of diamond value during the period 2003-2004

- Difficulties experienced by investigators during the investigation of these cases

- Employee suspected but could not be pursuit due to insufficient evidence

- Contract employees suspected but could not be pursuit due to insufficient evidence

The case dockets at Cullinan Diamond Mine are kept by the investigator locked in a safe for security purposes. The purpose of case docket analysis was also to determine the source of the information which led to an investigation and the challenges experienced during the investigation of these cases.

The objective of the case docket analysis was to assist the researcher: Firstly, to understand how the information in the incident registered came to the attention of security. Secondly, the *modus operandi* of the perpetrators. Thirdly, how the arrests were made. Fourthly, the criminal conviction of the perpetrators. Lastly, the disciplinary hearing outcomes, as well as the role played by security intelligence in finalising the cases (Cullinan Diamond Mine, 2018).

The results of the case docket analysis are discussed in Chapter 4.

2.4.5 Online intelligence system

The online intelligence system was analysed so as determine the type of incidents reported, to identify only diamond theft-related incidents and the value of anonymous tip-off calls, in an effort to evaluate the value or not of the use of intelligence to prevent and detect diamond theft. The online intelligence system and an electronic data base in which all information received from sources is loaded and this is also the system in which investigation is logged for record purposes. In this regard the information on the electronic data base was perused by the researcher for the purpose of the case docket as discussed above. The electronic data base is also used by the security data analyst for the purpose of information report analysis in order to produce intelligence. Reports received through the anonymous tip-off line are also loaded on the electronic data base by the analyst.

For the purpose of this study the researcher analysed data captured on the online intelligence system. The purpose of the online intelligence systems is to capture all production and crime-related incidents. These incidents include blockages in the Diamond Value Chain, breakdowns, delays, spillages of Kimberlite material, holes in process pipes, manipulation of the Diamond Value Chain (DVC) systems, fence breach, general theft, diamond theft, fraud and corruption. Once these incidents are loaded on the systems the security data analyst analyses the information for trends and pre-warning of threats, risks and loops.

A total of eight quarterly reports were selected for the purpose of this study out of a total of 16 quarterly reports. All reports selected, clearly indicated the trends in ore processing incidents and crime-related incidents. The trends drawn by the security data analyst indicated the type of incident, time, date, machine, location and individual/s involved. The crime-related incidents clearly indicated the time, date, location and pattern of the crime incidents committed on mine.

All 96 copper theft-related cases selected were resolved successfully and the perpetrators arrested and convicted by the court. In all these cases the suspects were charged with the theft of copper cables.

2.4.6 On-site observation

The researcher visited both the surface and underground area for the purpose of this study. During the visit to these two diamond sites, the researcher was accompanied by a well experienced ore processing and mining foreman. The purpose of the visits to these environments was to give the researcher a first-hand experience and understanding of the two different environments, risks and challenges experienced.

The researcher also visited the underground and plant area of the mine. The purpose of the visit was to familiarise the researcher of the Diamond Value Chain process, risks, security procedures and security measures in the Diamond Value Chain. During the visit to the Diamond Value Chain process the researcher was accompanied by an experienced plant foreman, as well as an underground foreman. During this visit hand-written notes and photograph pictures of the various Diamond Value Chain processes were taken of all risks, security measures and technical challenges experienced that impact negatively on security measures for the protection of diamonds.

Hand-written filed notes and photos were taken by the researcher for reference purposes and analysis.

Overall the study focused on identifying different processes within the Diamond Value Chain through which the kimberlite flow. This study further looked at the inherent risks within the Diamond Value Chain which further assisted the researcher in identifying areas of opportunity for theft of diamonds within the chain. The different security measures applicable at Cullinan Diamond Mine within the Diamond Value Chain were also looked at, versus the risks identified by the researcher through the various steps undertaken by the researcher in collecting information relevant to this study. The security measures investigated by the researcher during this study included the use of intelligence-led and technology solutions in combating diamond theft at Cullinan Diamond Mine. The research design focused the efforts of the researcher on the end-

product of this study, including all the steps in achieving the anticipated outcome (De Vos et al, 2016: 143).

The on-site observation was followed by the perusal of the online intelligence system (electronic data base) to also get a good understanding of the cases investigated at Cullinan Diamond Mine. The handwritten notes from both the on-site observation and case docket analysis will assist the researcher during the one-on-one interviews and ensure that the researcher ask questions having a good background of the environment and cases investigated. The perusal of the case dockets and online intelligence system will be followed by one-on-one interviews with respondents. Only questions relevant to the study will be asked. Detailed handwritten notes will be taken during interviews to allow for good records. The researcher will also record one-on-one interview with the permission of the respondents. Design refers to all those decisions the researcher put in motion for the purpose of the study (De Vos et al, 2011: 307).

2.5 DATA INTERPRETATION AND ANALYSIS

All participants were asked open-ended and closed questions during the interviews for the purpose of this study, to which the participants gave their opinions and shared their experiences within the Diamond Value Chain. All responses provided were recorded accurately through an audio/voice recording device and in some instances through hand-written notes.

The researcher paid attention to all the responses provided during interviews and then gave particularly attention to responses provided by participants from the same work environment. For example, participants from the security department, ore processing department and mining environment. The researcher further compared responses from different operations for similarities within the same work environments. The researcher noted similarities to responses to the same question. After collecting data, the raw data must be prepared which involves editing, reorganising and coding (De Vos et al, 2011: 252).

2.6 VALIDITY AND RELIABILITY

2.6.1 Methods taken to ensure validity

Validity is a measure used in measuring the quality of the raw information collected (Bordens & Abbott, 2014: 129). It is important for the researcher to validate the responses provided by the participants to the ensure accuracy of the information. In this regard the researcher ensured that the questions for all participants from the same work environment within the DVC were the same. During the interviews the researcher examined responses and requested clarity where responses were not clear. All participants directly involved in the Security Department were asked the same questions relevant to their scope of operation to ensure that the researcher would be able to compare responses provided where necessary and possible.

The participants were informed prior to the interviews that the confidentiality of their responses would be ensured, which allowed the participants to participate freely. The confidentiality of the participants throughout the interviews was ensured to protect their identity. All personal information seen during the perusal of case dockets on the online intelligence system at Cullinan Diamond Mine was not used in any way in this study.

In this study all the information collected was recorded as accurately as possible by the researcher to avoid misinterpretation of the interviewees' responses as intended to the interviewer. The researcher also ensured that in selecting the sample of the participants to be interviewed that only those with experience relevant to this study area were interviewed so as not to clutter this study with irrelevant information.

2.6.2 Methods taken to ensure reliability

Gast (2010: 98) states that the measurement used must be that the activity observed must correspond with the activity under natural circumstances. According to Bui (2009: 149) reliability is an extent to which the measurement tool consistently measures what it was intendent to measure. Kenneth et al, (2014: 126) states that if the same activity is repeated it must produce the same result.

In this study during the interviews and review of internal case dockets and study of policy and procedures documents the researcher have as far as possible observe

specific trends in the participant's answers and information collected. The information recorded determines patterns of reliability by all participants. The researcher compared the responses of the participants from the same work environment to determine reliability of answers provided. The information provided during one-on-one interviews was compared to information received during case docket analysis, plant visit, underground visit and analysis of information from the online intelligence system. Responses received from participants from other operations was also compared to the information received from participants at Cullinan Diamond Mine for reliability.

2.7 ETHICAL CONSIDERATIONS

Informed consent from participants

An informed consent was received from each participant before commencing with the interviews. The participants participated in the research study voluntarily without being forced. The participants were also given an option to withdraw their participation in the study at any time during this study. The researcher also explained in detail to all participants the purpose and aims of this study and its benefits. (See Annexure C).

Protection of identities

The identities of all participants were in no way compromised throughout this study. To protect the identity of participants the researcher referred to participants as Participant 1 up to Participant 30.

Confidentiality

The confidentiality of the answers given by all participants during the interviews has in this study not been compromised in any way. In reporting on the information in this study the researcher did not compromise the identity of the participant, neither the answers given in confidence to the researcher.

Sources consulted

All sources consulted during this study have been referenced for the research study and are included in the list of references.

Honesty with professional colleagues

Throughout the research study the researcher was cognisant of the fact not to portray information received from other sources and not to make a false representation.

Permission to undertake the research at Cullinan Diamond Mine and all other Petra diamond mine operations in South Africa

The researcher received an approval letter granting the researcher permission to conduct the research (See Annexure C).

The researcher received signed consent forms from all participants in this study before continuing with the interviews. The researcher ensured that the identities of the participants are protected by referring to the participants as: Participant 1 up to number 30.

Kenneth et al (2014: 203), state that anonymity and confidentiality regardless of the research environment must be maintained of all the participants and the secrecy of their responses.

De Vos et al (2016: 113), state that the study should be based on trust, acceptance, co-operation, promises and well-accepted agreements and expectations between all parties involved in a research study. The participants also need to be fully informed about focus, scope, aims and objectives of the study (Devlin, 2006: 169).

The researcher is aware of the possible conflict of interest given the fact that the researcher is employed by Petra Diamonds, Southern Africa and funded by the company too, however the researcher has adhered to the ethical conduct of research during this study by being objective on all presented information throughout the project.

2.8 PROBLEMS ENCOUNTERED DURING THE RESEARCH

Availability of literature studies on diamond theft

The researcher struggled to find appropriate literature as he was hampered by a paucity of literature studies on diamond theft. Not many authoritative sources are available on the diamond theft, despite the challenges faced by the diamond mining industry.

Availability of employees for interviews

The lack of availability of participants and rescheduling of meetings affected the time frame of the research study. In one instance the researcher had to withdraw a participant due to the participant's busy schedule. The fact that the participant had to be withdrawn did not affect this study, because the participant was not directly involved in the Diamond Value Chain, which is mining. The questions of the withdrawn participant were covered by (Respondent No. 12, 2016) during the interview. The researcher experienced problems of availability of some of the participants as some of the scheduled interviews had to be rescheduled for other dates and times frequently.

Language

The researcher also experienced problems with the interpretation of some questions by some participants and the researcher had to repeat the question(s) to make sure that the participants understood the question correctly before providing an answer. The researcher can speak and understand English, Pedi, isiXhosa, isiZulu and Afrikaans. During the interviews in some instances the researcher allowed the participants to express themselves in their preferred home language although the interviews were conducted in English. Regarding the latter the researcher repeated what was said in English to the participant to make sure that the right answer was captured.

2.9 CONCLUSION

This chapter provided an outline of the research design, research approach and techniques used in collecting relevant information for the purpose of this study. The chapter also provided and overview of how the answers received from the participants were compared and analysed for validity and reliability. Several research methodology stages were discussed in the chapter which included sampling, data collection, data interpretation, validity, reliability and ethical consideration.

In the next chapter, Chapter 3, an overview and review of the literature will be given, encompassing the Diamond Mine Industry in South Africa, kimberlite processing stages at the Cullinan Diamond Mine, as well as security measures at the mine….

CHAPTER 3
OVERVIEW OF DIAMOND THEFT AND LITERATURE REVIEW

3.1 INTRODUCTION

This chapter is an overview of the literature which has been studied, relating to the Diamond Mine Industry in South Africa. De Vos, Strydom, Fouché and Delport (2016: 134), state that the aim of a literature review is to contribute to a clearer understanding of the nature and meaning of the problems already identified.

Bouvier (1856, as cited in *The Free Dictionary*, 2019: np) defines property as anything a person owns or owned by an entity. In this regard diamonds produced at Cullinan Diamond Mine are considered company property and get assigned a value once recovered from the kimberlite material PDSA-SPP-01 policy. Syndicates operating around Cullinan Diamond Mine collude with mine employees and contractors to steal diamonds produced at the mine CAS 37/2006.

Cullinan Diamond Mine is an underground block cave mine located 35 kilometres north-east of Pretoria, in the Gauteng Province of South Africa. The Kimberlite pipe still contains the world's largest indicated diamonds resource of 186.8.2 million carats, included in the total resource base of 203.7 million carats including tailings material. Cullinan Diamond Mine undertook an expansion programme with the objective to take production from just over 850 000 carats per annum to 2.4 million carats per annum by the 2019 financial year (comprising 2.0 million carats directly from mining operations and 0.4 million carats from tailings material) (The Southern Africa Institute of Mining and Metallurgy, 2013: 72).

This chapter will focus on the extent of diamond theft at Cullinan Diamond Mine. The focus will also include the *modus operandi* of syndicates operating around Cullinan Diamond Mine, including employees and contractors who collude in order to steal from the mine. The chapter will also focus on the measures put in place by Cullinan Diamond Mine to prevent diamond theft from the mine.

3.2 THE DIAMOND MINING INDUSTRY IN SOUTH AFRICA

The diamond industry in South Africa is regulated by important legislation, by the Constitution of the Republic of South Africa, the Mineral and Petroleum Resources Development Act, the Diamonds Act and the Diamond Export Levy Act (Ndlovu, 2012: 25). Ndlovu (2012: 100) further states that one of the most important features of diamond sales in the South African diamond law, is the establishment of the statutory body called State Diamond Trade which is aimed at overseeing activities within the diamond industry.

Ndlovu (2012: 3) states that the diamond mining industry contributes about one percent to the South African economy's Gross Domestic Product (GDP). In 2015, according to the Chamber of Mines of South Africa, the diamond industry produced 8.2 million carats with a total sale of R14.4 billion in the same year. In 2013 the number of people employed in the local diamond industry increased by 11.3% to 13547. In the same year employees' salaries and wages was R2.9 billion up from R2.4 billion in 2012 (Chamber of Mines of South Africa, 2013).

The researcher believes that in order for the diamond industry to continue contributing both to the GDP of the country and to the reduction of unemployment in the country, the environment within which the industry operates must be safe, secure and conducive to further expansion of operations. In this regard the security of diamonds produced at Cullinan Diamond Mine must be ensured for the company to realise the full value of operating the mine. Petra Diamonds has invested a significant amount of capital into its new operations in South Africa, in order to increase the output of rough diamonds. The capital invested by the company must generate value, otherwise there is no incentive to investors to continue to invest in the company and the possibility of them withdrawing their funds always exists. Accordingly, securing the diamond output and preventing their theft is crucial, not only for the continued Petra Diamonds operations, but also for the economic impact (positive) of local communities.

3.3 KIMBERLITE PROCESSING STAGES AT CULLINAN DIAMOND MINE

3.3.1 Underground operations

The mining of the Kimberlite ore at CDM begins with the underground environment, where production must take place for the material to reach the surface for processing. The mining stages underground include:

- **Drilling and blasting:** these are the first phase of mining underground;

- **Loading hauling dump:** after the kimberlite has been blasted, the material must be loaded by machine from tunnels;

- **Crushing:** the kimberlite material after blasting is still in big sizes and therefore must be crushed to fractional required sized in order to be transported through a conveyor belt;

- **Belts:** once the kimberlite material has been crushed into required sizes the material is transported through conveyor belts up to a point where the material is hoisted by skips; and

- **Shaft:** this phase is responsible for hoisting the material from the underground to the surface where the material either gets fed into the plant or fed into the stockpile on the mine for future use (Respondent Nos. 1 & 2, 2016).

The production process underground requires the involvement of the workers on the plant throughout, which includes cleaning of spilled kimberlite material, unblocking, drilling, blasting and loading. Although the pick ability of the workers (opportunity of employees picking up diamonds on mine) of diamonds underground is remote, Cullinan Diamond Mine has a diamond control policy and procedure in place which regulates the picking up of diamond looking objects both underground and on the plant on the surface (PDSA-SPP-01, 2009; CD-SEC-03 2008).

The PDSA-SPP-01, (2009) policy on diamond control drafted at the top level of management gives guidance to the drafting of the pickup procedure. The policy also guides in terms of what happens when a pickup is reported by an employee which includes rewarding for the pickup.

The procedure CDM-SEC-03, (2008) outlines the actual steps which needs to be followed when a pickup is reported by employees at Cullinan Diamond Mine. In terms of the steps to be followed is that when an employee observes an object which resembles a diamond either underground or surface the employee observing need not pick up the object but must report this to his/her supervisor who will call security to assist. If possible, the employee observing must not move from the spot where the object is observed but rather inform a fellow employee to inform his/her supervisor or security.

Upon the arrival of security at the point where the object has been observed photos will first be taken by the security official, the object will be sealed into an envelope and locked into a metal container. The employee who observed the object will be given a receipt by security at the spot confirming the date, time, details of the employees, details of the security official who assisted and the spot where the object was picked up. The receipt will be signed by both the security official and the employee who observed the object. The object will then be taken to the sort house (final recovery) where it will be tested if indeed a diamond. Once confirmed the employee will be given feedback and a percentage of 30% of the value of the diamond be paid over to the employee. In an event that the object is confirmed to be not a diamond the object will be destroyed in the presence of the employee who observed or reported the object.

3.3.2 Surface operations

The kimberlite material, hoisted from the underground, is taken through different stages of the Diamond Value Chain in the plant in order to facilitate the process of recovering diamonds from the mined ore material and this includes the following:

- **Mill:** this is a process where the kimberlite material gets crushed into smaller and required different sizes;

- **Dense medium separation:** this process involves the concentration process where waste material gets separated from diamond bearing material; and

- **Final recovery:** the final recovery process uses both X-ray machines to recover diamonds from the system, workers to sort the material and separate diamonds from waste (Respondent Nos. 8 & 11, 2016).

All the processes in the plant require human involvement, both to ensure efficiency of the process and monitoring. The involvement of the workers during the surface plant operations include the cleaning of spilled diamond-bearing material from the plant floor and under the conveyor belts. The cleaning process also includes unblocking of concentrate pipes or chutes, unblinding of screen panels which is a process where material blocking panels openings are removed by hands and tools.

The final product which is diamonds and after being sorted by the sorters and X-ray machines, is then sorted into different sieves sizes, packaged and locked up in a safe (PDSA-SPP-01, 2009).

3.4 SECURITY MEASURES AT CULLINAN DIAMOND MINE

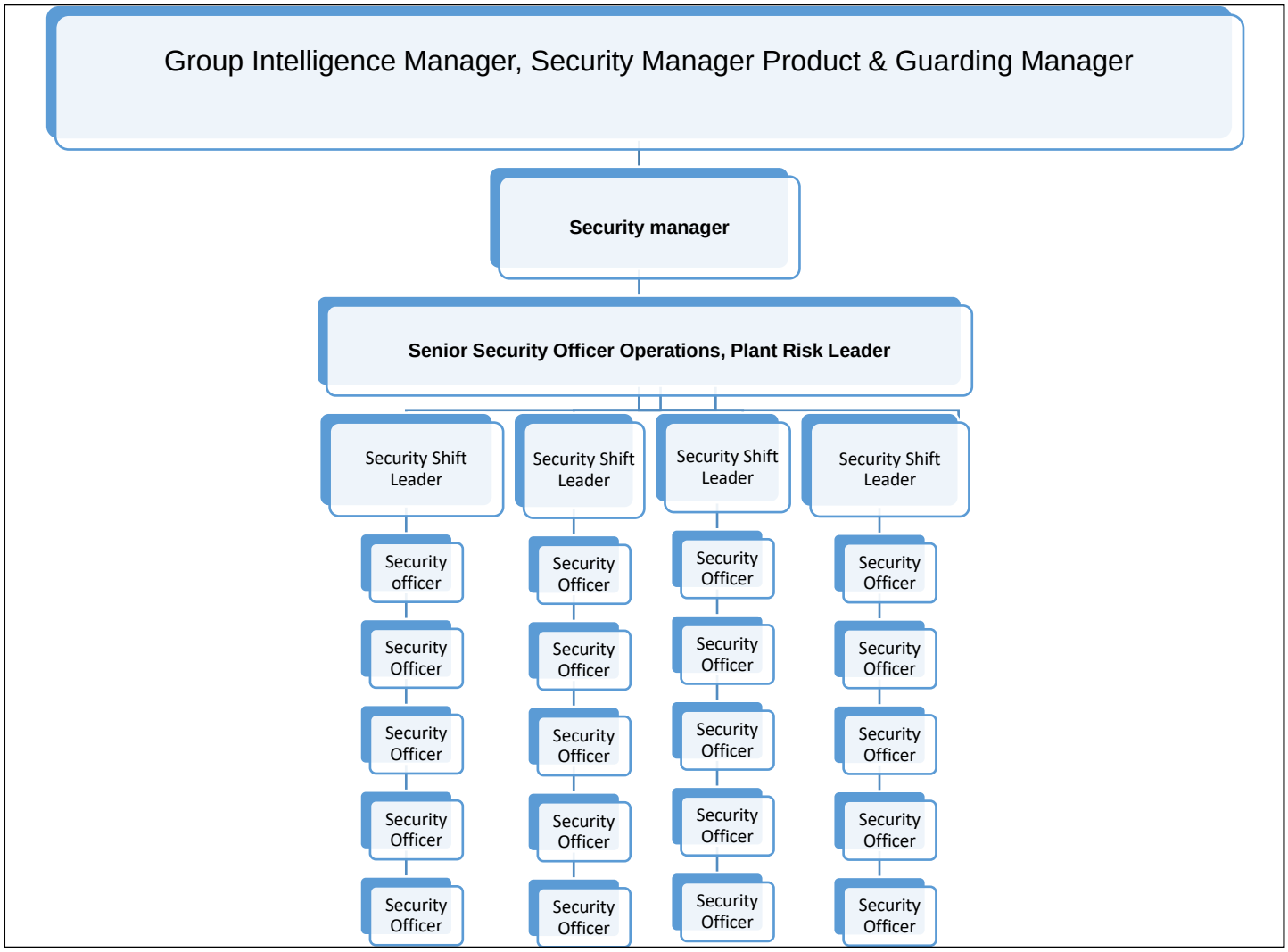
3.4.1 Introduction

Security at Cullinan Diamond Mine is considered an important component of the organisation. Cullinan Diamond Mine has a security manager who heads the department and ensures that security measures are in place to protect the company

assets. The security manager has other employees reporting to him which ensures the implementation of security measures as required (CDM-SEC-01, 2006).

Several security measures are in place at Cullinan Diamond Mine, which include security alarms, CCTV cameras, policies and procedures, security officers and body x-ray machines. All security systems are linked to the control room which is operated by an operator. All crime incidents reported are recorded and investigated. The Security Department at Cullinan Diamond Mine is also supported by security intelligence, investigation, a diamond control unit and guarding division which are all functions located centrally at head office (CDM-SEC-19, 2008).

Figure 3.1: Security Structure at Cullinan Diamond Mine



(CDM-SEC-219, 2008)

The security structure at Cullinan Diamond Mine has a security manager who heads the department. The security manager has two seniors who reports directly to the manager and one of the seniors is responsible for the diamond value chain with his own team. The other senior oversees the operation which includes patrols, surveillance, monitoring of alarms, access control and all other duties related to the function of security on mine.

The security manager structure is supported by the three (3) legs above the security manager which includes the group intelligence manager who also manages investigations, the security manager for product protection who is also responsible for the diamond value chain and the guarding manager who works very close with the security managers at operation level. All these three functions support the security managers at different operations owned by Petra Diamonds.

3.4.2 Security policies and procedures

Petra diamond South Africa is currently finalising a security strategy document which will serve as a guide for operations. The security policies which guide operations are compiled at group level and distributed to operations to allow the security manager of the specific operation to draft procedures in line with the policies (Respondent No. 12, 2016).

The Security Department procedure, CDM-SEC-29, at Cullinan Diamond Mine has areas on mine divided into different categories informed by the risk exposure of diamonds and this includes the following:

- **Red area:** Recovery and sort house, these areas are regarded as high risk for diamond exposure.

- **Pink area:** Post cyclone, these areas are regarded as medium risk for diamond theft.

- **Blue area:** these are areas inside the mining area, including the pre-cyclone processing, operations underground, loading bins, stockpiles and workshop which are classified as low risk for diamond theft.

- **Green area:** company premises outside the mining area such as administration buildings and parking (CDM-SEC-29, 2009).

The purpose of the security policy is to provide a safe and secure business environment for the company and its people and maximise shareholder value (Cullinan Diamond Mine, 2009: 3).

Cullinan Diamond Mine has several procedures which outlines steps to be followed, which are aimed at the protection of diamonds and company assets and these procedures include the following, namely:

CDM-SEC-29. 2009: Diamond security procedures

This procedure sets out the steps and rules for all employees at Cullinan Diamond Mine with regards to diamond protection. The procedure further sets out steps to be undertaken by security in order to ensure diamonds protection at Cullinan Diamond Mine. Failure to adhere to the rules sets out in the procedure renders the employee concern guilty of an offence.

CDM-SEC-05, 2009: Access Control

The access control procedure sets out requirements for any person to be allowed on mine premises. In terms of the policy any person must be vetted before being granted access to the mine. The requirements set out in the procedure includes that the individual requiring access not to have been found of any offence but should the person have been convicted for any offence this will have to be declared to the Security Department prior being granted access.

CDM-SEC-01: 2006. X-ray scan operating procedure

The procedure sets out the rules and purpose for the use of the x-ray machine at Cullinan Diamond Mine which is primarily to protect diamonds. In terms of the

procedure employees are made aware of items which they may not take out of the high-risk areas. The are also health issues which relates to the usage of the x-ray machine which Cullinan Diamond Mine must comply with and this is set out in the procedure.

CDM-SEC-08, 2008: Surveillance

The procedure sets out the rules around the use of cameras on mine. The rules in the procedure also makes it an offence for any employee to temper with security cameras in different diamond value chain processes at Cullinan Diamond Mine.

CDM-SEC-03, 2008: Pick-up procedure

The procedure is aimed at encouraging employees to report diamonds picked in the diamond value chain. The procedure sets outs steps to be followed by an employee who observes an object which appears to be a diamond. The procedure also sets out steps to be undertaken by security when a report of a possible diamond is reported to the security control room. Failure to adhere to the procedure would make the concern employee guilty of an offence which is dealt with in terms of the company disciplinary procedures.

PDSA-INTEL-02: Vetting policy

The vetting policy sets out steps to be undertaken when an employee is due for his/her annual vetting. The policy also outlines steps to be followed prior to the recruitment of a new employee by Cullinan Diamond Mine. The procedure requires that a new company must be vetted before doing business with Cullinan Diamond Mine. The procedure also sets out requirements to be met by the applicant before access is granted to the mine.

PDSA-INTEL-01: Security Intelligence policy

The policy sets out guidelines and rules which must be observed by all those involved in the intelligence function. The policy regulates daily activities of intelligence and process followed in producing the intelligence product. The policy also outlines how informers are recruited and handled by operators. Failure of any person to adhere to these rules and requirements makes the concern employee guilty of an offence which is dealt with in terms of the company disciplinary procedures.

Although the Cullinan Diamond Mine has policies and procedures in place to assist in the protection of diamonds at the mine, the challenge of diamond theft cannot be resolved by merely putting a procedure in place.

3.5 COMPONENTS OF THE INTEGRATED MINING SECURITY MEASURES' SYSTEM AT THE CULLINAN DIAMOND MINE

The following are the types of security equipment that assist the overall implementation of the mine's security system:

3.5.1 X-ray systems

Cullinan Diamond Mine uses the Xscann system to detect diamonds hidden on the body, but no success has yet been achieved through the technology, although it does serve as a preventive measure (CDM-SEC-01, 2006).

Xscann body scanner

Cullinan diamond mine makes use of the full body Xscann to detect diamond theft on mine. Although no arrest has been made using X-ray technology, employees working in the area are from time-to-time found exiting with personal items which may not exit the area. Violation of the procedure is treated in terms of company disciplinary policies and procedures. According to the procedure in place at Cullinan Diamond Mine, only competent and trained security officials may operate the x-ray machine (CDM-SEC-01, 2006).

Image 3.1: Xscann body scanner

Baggage X-ray

Cullinan Diamond Mine makes use of the baggage x-ray technology to detect unwanted equipment from being removed from the mine which is unauthorised. In using this technology, the bag is put through the machine in order to detect any unwanted equipment. The scanner has been successful in detecting equipment in some employee's bags from the mine who were either attempting to remove items unauthorised from the mine, or employees who claimed to have forgotten company items in their bags (CDM-SEC-10, 2008).

Image 3.2: Baggage X-ray machine

Metal detector scan

Cullinan Diamond Mine also makes use of a metal detector machine to scan over employees and to clear them of any unauthorised metal implements or containers before entering the mine. This technology is, however, not used to detect diamonds at Cullinan Diamond Mine, but only metal items which an employee may be carrying on his or her body (CDM-SEC-20, 2008).

Image 3.3: Metal detector scan

3.5.2 CCTV camera surveillance system

Cullinan Diamond Mine uses CCTV cameras at the mine to monitor plants and perimeter fences. Although cameras are used at the mine, the challenge of diamond theft does continue because cameras can only cover some areas on the mine, not all. There are, however, documented successes achieved using cameras at Cullinan Diamond Mine in which some employees were found to have violated security procedures (CDM-SEC-08, 2008).

Surveillance has become a part of our daily lives and has become a measure used to reduce risk. Mining activity underground and on the surface happens across a wide area and therefore security personnel cannot cover every portion and surveillance can therefore be used to monitor these areas remotely (Kroener, 2014: 8-11). CCTV cameras are often aimed at crime control or prevention of crime (Kroener, 2014: 34). Taylor (2013: 17) states that despite the pervasive presumption that CCTV cameras are solely used to prevent crime, it has found many non-criminal applications.

Surveillance cameras play an important role in the prevention of diamond theft on mine. It is the view of the researcher that surveillance is still underutilised at Cullinan diamond mine due to several factors which affects the efficiency of the CCTV system. Constant redesigning of the diamond value chain result is cameras having to be

moved from time to time in some instances resulting in some areas being left exposed because of lack of cameras (CDM case nr: 56/2007 and SAPS 47/04/2008)

Covert cameras

Cullinan Diamond Mine also makes use of a covert camera system to prevent and protect their diamonds. There are, however, strict rules stipulated in both the intelligence policy and the investigation procedure in the steps to be followed before a covert camera is installed in any area. One of the important rules is that privacy of employees must be respected at all cost and secondly the intelligence manager must sign off the operation plan before implementation.

The use of covert cameras on the mine must comply with all other relevant legislation which includes the Republic of South African Constitution. Employees working at Cullinan Diamond Mine are also warned and made aware of the use of covert cameras on mine and against any wrongdoing (CDM-SEC-14, 2008) and PDSA-INTEL-01, 2013).

Internet Protocol (IP) video surveillance

The Internet Protocol (IP) is the method in which data is sent from one computer to another on the Internet. IP surveillance is a digitalised and network version of CCTV. IP camera records' video footage and the resulting content is distributed over the internet protocol network. There are benefits which come with IP surveillance which include the following, namely:

- Improve search capability, when searching for a specific date and incident;
- Greater ease of use by operators. Better quality images and no degradation of content over time;
- Ability to record and play and the same time;
- Ability to compress content for improved storage;

- Improved ability for remote viewing and control via cell phone or laptop;

- IP makes it possible to store data in any geographical location; and
- Greater distribution and the ability to connect to email and other communication system so that alerts can be sent automatically (Rouse, [Sa]: np:).

The IP video surveillance design provides access to videos at any time, from any network location, allowing remote monitoring, investigation and incident response by remote security personnel (CISCO, [sa]: np).

3.5.3 Access control system

Biometric access control

Cullinan Diamond Mine uses the fingerprint biometric access control system in conjunction with ID access cards to manage access into and out of the mine. Biometric access control is also used at Cullinan mine to control access into all areas which includes plants and administration buildings (CDM-SEC-05, 2009).

3.5.4 Seal management system

Cullinan Diamond Mine uses the seal management system in which access to certain areas and concentrate pipes is managed by seals. There is a seal register in different plants which is managed by the security officials. Upon breaking a seal, the security officials must record the broken seal and indicate the new seal put on in sequence (CDM-SEC-18, 2008).

3.5.5 Security investigations

Petra Diamonds have an investigation function located within the security intelligence section. This function is located within the Petra Diamonds' group structure which provides support services to all Petra Diamonds' operations security. All incidents detected at Cullinan Diamond Mine which needs to be investigated are referred to the group investigation function, which will then investigate the case and make recommendations.

The function has thus far been effective, although the load of cases reported often results in the delay in finalising cases, which result in unhappiness from other stakeholders who require the investigation function. The cases referred to this investigating section include the dealing and trading in illicit diamond cases. The group investigation function also liaises with outside stakeholders such as the local police and other structures of the SAPS. The group investigation function also plays an important role in initiating police projects or operations when intelligence information received dictates. This function reports directly to the group security intelligence manager (CDM-SEC-14, 2008) and PDSA-INTEL-01, 2013).

3.5.6 Security intelligence

Cullinan Diamond Mine does not have an intelligence capability at operation level. However, this function is located within the group structure of Petra Diamonds which support the operations. Respondents No. 12, (2016) and No. 27, (2017) indicated in their responses that the security intelligence function has intelligence collectors which provide support to the operations and Cullinan Diamond Mine is also supported by this structure. These two respondents further indicated that the intelligence collectors recruit human sources who then provide information on illegal acts threatening Cullinan Diamond Mine. According to these two respondents, the received information from sources is then verified through the intelligence cycle to produce intelligence which assist the Security Department to address the identified threats. The participants also indicated that the produced intelligence is given in a form of a written report to the security manager at Cullinan Diamond Mine for attention (Respondents No. 12, 2016) & No. 27, 2017).

The intelligence capability at Cullinan Diamond Mine is used to support management decisions with regards to policy and procedure formulation, prevent crime strategies and to pre-warn various stakeholders on the mine of possible threats to their departments. The security intelligence section also assists in detecting crime incidents which include diamond theft and provide support to production on the mine.

Information collected from the Cullinan Diamond Mine, includes all production-related incidents, such as blockages of the system where the diamond-bearing ground runs, spillages of diamond-bearing ground, breakdowns in the diamond-bearing systems or

anything that affects production negatively. All security-related incidents within the Diamond Value Chain, such as broken seals, breaches of fences, suspicious behaviour of employees in the plants, breach of security policies and procedures, reported cases and incidents of theft are recorded and analysed and turned into intelligence information to be used in investigations and prevention (of diamond theft) operations (PDSA-INTEL-01, 2013).

Information is material which is derived from rumours, communications, reports, imagery and other sources from which intelligence is produced. Information may be true or false, accurate or inaccurate, confirmed, unconfirmed, pertinent or impertinent, positive or negative. George and Kline (2006: 17), suggest that 'Intelligence' is the product resulting from the collection, evaluation, and interpretation of information.

The Cullinan Diamond Mine has a group support structure which is security intelligence, and which provides this capability. The security intelligence function has a security data analyst who analyses all information and uses the traditional intelligence cycle. During the analysis process, not all role players are included such as the investigator and consumer of intelligence. All reports generated by the security data analyst are submitted to the group security intelligence manager, who would then communicate these reports with different stake holders at Cullinan Diamond Mine including the security manager. The report generated by the analyst is a quarterly report which covers production-related and crime trends. The quality and accuracy of the report are largely determined by the quality of the raw data, which is populated on the data base from which the analyst extracts information (PDSA-INTEL-01, 2013).

The traditional intelligence cycle

In the traditional intelligence cycle, intelligence is described as following a series of steps in the process of collecting information to process as intelligence. The intelligence cycle comprises of five stages namely, planning, direction, collection, processing, all-sources analysis, as well as production and dissemination (Gill & Phythian, 2006: 2)

The different stages in the cycle depict a series of steps which must be taken in each stage in producing intelligence. The cycle also defines an anti-social series of steps

which constrain the flow of information. During this process, the cycle separates the collector from the processors, too often resulting in information being discarded or passed on to someone else and then becoming another person's responsibility for the quality of the final product (Clark, 2010: 10-11).

Online intelligence system

In applying the traditional intelligence cycle at Cullinan Diamond Mine, the mine plant security personnel have a book in which they record all the security incidents. For example: spillage of diamond-bearing ground; breakdown of production systems, changing of sorting gloves at the sort house, blockages of system carrying diamond-bearing ground and open handling of diamond-bearing ground. The information received, gets captured on a security data bases called Online Intelligence System. The Online Intelligence System is an electronic system in which all information is stored for future use and reference. Information captured on the data base is used to build trends. Information collected through sources is also captured on the data base. The intelligence cycle is used to analyse information capture and during this process there is a constant communication between the security data analyst and the collectors of information. Intelligence is disseminated via reports to the customers

The private sector existence is dependent on investing wisely in any resource. Therefore, the intelligence function must add value in the support it provides to the security manager and Cullinan Diamond Mine to be cost effective (PDSA-INTEL-01, 2013).

3.5.7 Guarding and patrolling

Respondent No. 13 (2016) indicated that Cullinan Diamond Mine security consist of both permanent security officials and contract security officials. According to the participant, the number of security officials is determined by the site requirements. Furthermore, the participant indicated that patrols conducted daily by the security officials on the mine, are in accordance to the site requirements and intelligence reports received from the analyst.

The security officials operating on the mine, are trained in terms of the standards of the Private Security Industry Regulatory Authority (PSIRA) and Cullinan Diamond Mine standards.

Cullinan Diamond Mine has patrol teams who monitor the perimeter fencing on a 24-hour period. The patrol teams are divided into small groups of two per vehicle and allocated specific areas to cover. The area covered by each team of patrollers is 6 kilometres wide. Each patrol team is allocated a 4x4 vehicle fitted with a spotlight, two-way radio in order to communicate with the control room hourly, torches, pepper spray for self-defence and handcuffs needed during an operation and possible affecting an arrest.

3.5.8 Vetting

Cullinan Diamond Mine has a vetting system in place, which is aimed at ensuring that criminals are prevented from entering the system of the company. The participant indicated that the vetting system applies to all individuals who have a relationship with Cullinan Diamond Mine. The participant further indicated that before a potential employee is employed by Cullinan Diamond Mine, the potential employee submits all relevant qualifications for the position and provides personal information which includes a copy of his identity document and address. The fingerprints of the potential employee are also captured. According to this participant, once the result of all captured information is received, the results are assessed, and a decision made whether to approve the potential employee or not and that this process also applies to contractors. The assessment of the result is done by the security data analyst who is employed by Petra Diamonds and located within the security intelligence department.

The objective of the vetting policy is to ensure that all employees, contractors, visitors and organisations are properly vetted prior to and during work/employment/conducting business with and or having access to Petra Diamonds (Petra Diamonds, 2015: 1). This policy covers all mining operations owned by Petra Diamonds including the Cullinan Diamond Mine.

During the vetting process, due to consideration of the following laws, policies and procedures are kept in mind to ensure that the company acts within the framework of

all relevant legislation (PDSA-INTEL-02). The following laws and forms are applicable to mining security:

Constitution of the Republic of South Africa 1996

During the vetting process at Cullinan Diamond Mine the Security Department must be mindful of the requirement of the constitution. The rights of individual to privacy must always be respected and that the employees or visitors including new recruits must give permission before vetting could be conducted on them. Information collected during the vetting process on any person must be protected and that no disclosure be made to any person without a written permission from the person concern. The vetting policy in place at Cullinan Diamond Mine does set out rules around the process of vetting in other to protect both parties which is Cullinan Diamond Mine and the person being vetted.

Employment contract

During the vetting process at Cullinan Diamond Mine due consideration of the employee's contract of the employee or contract involved is taken into account. Not all contracts of employment are worded the same in terms of the inclusion of polygraph test and this is taken into account.

A-PDSA-02: Security Vetting Consent, Indemnity and Waiver of Claims Forms

Consent forms must be signed by the applicant before vetting is conducted on the applicant and the purpose is to protect the company against possible litigation and also to respect the right to privacy of the application. No vetting will be done unless the consent form has been signed.

B-PDSA-02: Declaration by Applicant and Annexure C-PDSA-02: Confidentiality Undertaking

The purpose of the declaration is to afford the employees or contractor including a visitor the opportunity to declare any conflict of interest or any previous offence.

D-PDSA-02 Security Vetting Process and reps / Annexure E-PDSA-02 Security Vetting App for Rev

The vetting policy sets out steps to be undertaken when an employee is due for his/her annual vetting. The policy also outlines steps to be followed prior to the recruitment of a new employee by Cullinan Diamond Mine. The procedure requires that a new company must be vetted before doing business with Cullinan Diamond Mine. The procedure also sets out requirements to be met by the applicant before access is granted to the mine.

Anonymous tip-off line

Cullinan Diamond Mine has an anonymous tip-off line through which the company and the Security Department encourages employees and the public to anonymously report any criminal acts or suspicious activity by suspected criminals. This anonymous tip-off line is managed by an external stakeholder appointed by the company. Twenty-five reports had been received via the anonymous-tip off line that resulted in investigations and 16 of these reports resulted in successful disciplinary proceedings being instituted against the anonymously reported perpetrators (PDSA-INTEL-01, 2013).

3.5.9 Security awareness

As part of their whole mine security system, the Cullinan Diamond Mine has a security awareness programme in place through which employees are constantly made aware of security policies and procedures, changes to security procedures and encouraged to report wrongdoing. During this programme employees are also made aware of the impact of theft to the company, employees and the communities within the immediate operating environment of the mine. This process is also included in the induction process of new employees and contractors to the mine (PDSA-INTEL-01, 2013).

3.5.10 Intruder alarm systems

Cullinan Diamond Mine uses different alarms systems to monitor all buildings and access routes into certain high-risk areas, such as perimeter fence monitoring alarms and movement detection alarm. These alarm systems are linked to the security control room which is monitored 24/7 hours by the security shift leader for real time monitoring. The shift leader, upon receiving an alarm, then contacts the mine security patrol teams on the field for a response and feedback (CDM-SEC-06, 2008)

Respondent No. 13, (2016) indicated during the interviews that the alarms systems at Cullinan Diamond Mine have been very effective in preventing crime and unauthorised access in which in some instances criminals were arrested and successfully prosecuted. According to the participant, as the area was protected by alarms systems, the Security Department was able to detect unauthorised movement and prevented the crime during the response to the alarm. The participant could not give exact figures of these preventions over the years and no arrests were affected as a result.

3.5.11 Perimeter alarm system

The Cullinan Diamond Mine's perimeter fences are there to guard and protect the red and pink areas, which need to be protected from intrusion. These are monitored by perimeter alarm systems.

3.5.12 Cullinan Diamond Mine security incident analysis

Cullinan Diamond Mine, on average, records about 25 crime incidents per month although these incidents vary from month to month depending on the period of the month, projects on the mine and other events around the Cullinan area. The Security Department recorded an average of 3 300 crime incidents between the years 2003 and 2014. A table of the type of incidents recorded is provided below.

Table 3.1: Type of crime incidents experienced at Cullinan Diamond Mine: 2003-2014

Crime incident type
1. Theft of company property
2. Copper theft
3. Intimidation
4. Damage to company property
5. Damage to private property
6. Assault
7. Theft of private property

8. Illicit diamond trading
9. Tress passing
10. Unauthorised possession
11. Fraud
12. Verbal abuse/assault

(Respondent No. 6, 2016).

Cullinan Diamond Mine also records production-related incidents and on an average, the Security Department records about 30 incidents a month depending on the technical challenges experienced within the Diamond Value Chain, running projects and the period. The Security Department recorded an average of 3 960 production-related incidents between the years 2003-2014 (Respondent No. 13, 2016).

A table of the type of production/vulnerability incidents recorded is provided below.

Table 3.2: Type of Diamond Value Chain vulnerabilities

Type of vulnerability
1. Blockages/chokes/bottlenecks in the systems
2. Concentrate spillage
3. Overfeeding of systems with concentrate
4. Wear and tear
5. Hole in chutes
6. De-blinding screens within the diamond Value Chain system
7. Breakdowns
8. Equipment failure

(Respondents Nos. 6, 8, 9, 11 & 13, 2016; & Nos. 14, 15, 20, 2017).

Cullinan Diamond Mine records all crime and vulnerability incidents in order to provide a statistical overview of trends, identify loops in the system, prevent theft, prevent production delay by pre-warning the production manager on issues identified and prevent crime.

Respondent No. 6 (2016) indicated that the quality and accuracy of the reports produced by the analyst is dependent on the quality of the information of the population on the system and the skills level of the security officials working on the plant or general operation. In recording the incidents as they occur, the security officer must be able to gather all details around the incidents and this must be loaded as such by the security official in order to be accessed by the analyst. Any inaccuracy on the analyst's report could have serious ramification on the credibility of the analyst and the security department. Although systems have been put in place to record accurate information, no information is available in terms of the monetary value of each incident recorded by the security department.

The incidents indicated above have a variety of effect to the company which ranges from shortfall on target set, delay on shift target and ultimately on the budget of the company (Respondent No. 8, 2016; & Nos. 14 & 15, 2017).

If there is a choke or blockage experienced in the diamond value chain at a particular stage the surface system must be stopped to allow shift crews to unblock the system. The time spend on unblocking the system is dependent on the system of the diamond value chain blocked which can takes hours resulting is production time loss (Respondent Nos. 14,15 & 17, 2017).

The unblocking or unchoking of the diamond value chain result in employees getting into contact with diamond bearing material which creates an opportunity for diamond theft as a result during such events a security officer must be part of the process to ensure that no employees gets tempted. The same process is undertaken during major breakdowns in the diamond value system (Respondents Nos. 7,11 &13, 2016 & Nos.14 &15, 2017).

3.5.13 Cullinan Diamond Mine case docket analysis

Cullinan Diamond Mine recorded an average of 300 case dockets in a year between 2003 and 2014 with a total of 4000 case dockets. A number of these cases investigated were not diamond theft-related cases, but rather general, such as theft out of lockers, theft of copper cable, damage to company property, theft of private property and fraud.

In the Cullinan Diamond Mine, the case docket incidents' system presents all the relevant steps and basic information required before and during the investigation is adhered to, such as statements, profiles, recording of case dockets, details of suspects and witnesses. The outcome of each case docket investigated is also recorded on the system, while cases finalised are then referred to the courts and this step is also then recorded on the internal investigation docket.

One of the drawbacks of the Cullinan Diamond Mine' case docket and investigation system is that the time and effort of the investigator is more taken up by investigating other cases which are not diamond theft related. Cullinan Diamond Mine only has one investigator from the group security intelligence who provides a service to this particular security operation. Although there is a standing rule that the security official at operational level will conduct the initial investigation to alleviate the pressure on the sole investigation, there are still uncertainties around how this is done, and which cases are exactly investigated by the operational level security personnel. The skills level of the security officials expected to conduct the initial investigation is not the same, which sometimes results in some information getting lost during the initial investigation, or not collected properly to secure the evidence without contaminating it irretrievably. This can, and does, impact on the ultimate (successful) outcome of some of the cases investigated (Respondent No. 3, 2016).

3.5.14 Legislation applicable to security systems

Cullinan Diamond Mine has policies and procedures in place which guide the conduct of security officials in the execution of their duties and all these procedures are in line with the relevant legislation of the country, namely the following:

Criminal Procedure Act No 51 of 1977;

The Security Department at Cullinan Diamond Mine must ensure that they execute their duties within the ambit of the criminal procedure act. The duties referred to includes use of force during arrest of suspects, arrests and searches. In this regards Cullinan Diamond Mine has procedures which guides security personnel on what is expected from them such as use of firearms, searches, investigation conducted,

access control and what training skills of security officers (CDM-SEC-05, 2009. CDM-SEC-10, 2008. CDM-SEC-16, 2008. CDM-SEC-14, 2008 and CDM-SEC-19, 2008).

Diamonds Act No. 56 of 1986 as amended by the Diamonds Amendment Act No. 10 of 1991 (Sections 18, 19, 20 and 21);

The act makes it an offence for anyone to possess an uncut diamond without a licence. In this regard, security officers at Cullinan Diamond Mine endeavour to protect diamond from being stolen. Several security control measures are utilised to combat diamond theft at the mine, and this includes the diamond control policy and procedure PDSA-SPP-01, 2009 and the CDM-SEC-01, 2006).

National Strategic Intelligence Act 1994 and General Intelligence Law Amendment Act (No. 66 of 2000);

Petra Diamonds has an intelligence function which supports Cullinan Diamond Mine in combating diamond theft and other situations posing a risk to the interest of Cullinan Diamond Mine. In this regard the intelligence function has a policy in place which guides the activities of all security personnel within the intelligence function PDSA-INTEL-01,

Regulation of Interception of Communications and Provision of Communication Related Information Act (No. 70 of 2002);

The Act regulates the interception of communication and therefore makes it an offence to anyone to intercept any person's communication without the court authority. In this regard only the South African Police are allowed by the Courts the authority to intercept communication and therefore Cullinan Diamond Mine security must be mindful of the act requirement.

Protection of Personal Information Act (No. 4 of 2013) (known as the POPI Act);

The Act regulates the handling of information received as a result of your duties and functions. Cullinan Diamond Mine does conduct vetting on all employees annually and also during recruitment process as a result the Security Department must do everything possible to protect information of individuals received during this process and not disclose such without the written permission form the person concern. Petra

Diamonds has a policy which regulates vetting of employees and new recruits (PDSA-INTEL-02, 2012)

3.7 CONCLUSION

In this chapter the researcher focused on an overview of the security systems and measures in place at the Cullinan Diamond Mine for the protecting of the mine's operations and for the prevention of diamond theft. Cullinan Diamond Mine has recorded several successes using CCTV within the diamond value mine system. The same applies to the use of Xscann or Scannex, which technologies have assisted in preventing diamond theft Cullinan Diamond Mine. Cullinan Diamond Mine currently uses the Xscann system to prevent diamond theft from the red area. The use of Scannex or Xscann in a diamond mine is important as indicated in the case studies highlighted, since through this technology the use of security can detect employees carrying foreign objects on or inside their bodies.

The researcher, in this study, attempted to determine whether any intelligence information received assists in the prevention of the theft of diamonds from the mine and how this intelligence could be shared with consumers without compromising its integrity. Intelligence includes activities such as collection of information, analysis thereof and dissemination (Davies & Gustafson, 2013: 158).

The next chapter, Chapter 4, is a discussion on the research findings, the interpretation of the data collected followed by Chapter 5 with the conclusions and recommendations.

CHAPTER 4
RESEARCH FINDINGS AND INTERPRETATION OF DATA

4.1 INTRODUCTION

This chapter includes the analysis, interpretation and discussion of the collected data during site observation, docket analysis and responses from 30 respondents within the diamond value chain at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines – all operations owned by Petra Diamond Mines of Southern Africa.

Site observation

The researcher undertook a site observation on the 20 May 2017 and 21 May 2019 at Cullinan Diamond Mine. During this site observation the researcher visited both the underground environment and Surface at Cullinan Diamond Mine and handwritten notes were made and photos taken of the environment. During both dates the researcher was accompanied by a well experience plant foreman who has over 15yrs working experience within the diamond value chain at Cullinan Diamond Mine. The foreman was selected on the base of the experience to ensure that the responses collected during the visit does add value to the study.

Table 4.1: Underground area visited

Areas	Observation	Employee Activity
Conveyor belts	• Ore Spillage on the ground along conveyor belts • Ore material stucked on the conveyor belts • Blockage at interchange of conveyor belts	• Cleaning by shovels • Cleaning by water hose • Cleaning of conveyor belt • Unblocking
Production tunnels 763 Level	• Developments of tunnels • Drilling of tunnels	• Loading of material through machines • Cleaning of spillage by shovels
Stacker (Storage)	• Ore material from underground stored in the area when the ore processing plant is not operating	• Cleaning of the conveyor belt transporting material to the stacker

	due to maintenance or breakdown • Visibility of small particles kimberlite material which is easy pick able by hand	• Cleaning of ore material falling along the conveyor belt
Physical security system	• No physical or electronic security system are available underground.	

The researcher observation is that all work undertaken underground requires physical involvement of employees which exposes employees to the kimberlite material which contains diamonds. Cleaning of spillage of kimberlite with water hose along conveyor belts lubricates diamonds from mud making it easy noticeable.

The researcher observation is that diamonds could be picked in the underground environment. No security systems were observed underground which renders the environment uncontrollable from a security point of view. The underground environment is of such a nature that putting a security infrastructure in place would need a thorough assessment so that no safety risk is created to employees working underground. This is also as a result of other technology used for mining purposes. In this regard, human sources for intelligence gathering would play an important role.

Table 4.2: Surface areas visited

Area	Observation	Employee activity
X-ray machines	• Blockage due to either overfeeding, excessive water, big material running through the machine	• Unblocking • Cleaning • Normal maintenance
Final recovery Plant	• Kimberlite spillage • Removal of scrap from the area	• Cleaning of spillage through shovels and water on the floors • Cleaning of scrap before being removed from the area
Sort House	• Kimberlite spillage as a result of leaking pipes	• Cleaning of spillage by shovels and brooms under security escort

Plant screens	• Blocked screens as a result of oversize material	• Unblocking of screens by shovels and glove hands
Security X-ray machine	• X-ray machines used to scan employees exiting from the final recovery area and Sort house	• Security personnel scanning of employees exiting the final recovery areas
CCTV Cameras	• Several processes on surface and including in the final recovery and sort house are covered by cameras	• The cameras are monitored as a central control room
Biometric access control	• Access to the ore processing plants is granted through a biometric system • The employee vetting status must have been approved by security intelligence	• A rule is created for an individual employee before accessing the area • Employees inside kimberlite process areas are monitored through cameras from a central surveillance control room

During the surface visit by the researcher to several areas as indicated above it was clear that all process does require employee involvement in the process. Employee's involvement in the process entails cleaning or unblocking the process in which employees get into contact with kimberlite material. The contact with kimberlite material creates an opportunity for diamond theft. Daily contact with kimberlite material was also confirmed by all 30 respondents during one-on-one interviews. Cleaning of kimberlite spillage on surface to a large degree involves security personnel who conduct escorts to ensure diamond security. Employees exiting the final recovery and sort house are to make sure that they are free of any kimberlite material and this is followed by an X-ray scan before exiting the areas.

Although processes in the plants are covered by cameras and escorts a provided by security, however the element of collusion does pose a threat as also confirmed by (Respondents No. 3, 6, 8,12 &13, 2016; & Nos. 20, 24, 27, 28 & 29, 2017) during the interviews. All the aforementioned respondents stated that the biggest risk is collusion between security personnel and employees involved in the kimberlite processes.

In this regard it is the view of the researcher that security intelligence must have informers or recruit informers from among employees in order to gather information on any criminal intentions.

Internal case dockets analysis

During the site visit the researcher took a sample of 200 investigated and concluded case dockets relating to diamonds theft at Cullinan Diamond Mine. The purpose of the exercise was to have and insight of first how the information relating to these cases came to the attention of security in order to be investigated. The second purpose and main purpose was to determine the value of intelligence in combating diamond theft at Cullinan Diamond Mine.

The analysis of the researcher revealed the following about the sample of cases investigated. The information which lead to the initiation of the investigations was as a result of intelligence received implicating some employees, contractors or security officers in illicit diamond trading. The information came to the attention of security as a result of sources working at Cullinan Diamond Mine who provided information.

From a sample of case selected a total of 22 individual were dismissed from Cullinan Diamond Mine after being found guilty during internal disciplinary hearings held. The individuals dismissed included 13 employees, 7 contractors and 2 security officers in which all cases were reported to the South African Police Service.

The analysis of these dockets also revealed that employees and contractors involved in illicit diamond trading colluded with security in order to first understand the security systems beforehand. A total of 40 internal case dockets were close without any suspect being arrested to lack of evidence and this was also as a result of witnesses fearing to come forward and testify during internal disciplinary hearings.

Figure 4.1: Total sample of Illicit Diamond Trading (IDT) cases investigated at Cullinan Diamond Mine (2003-2014)

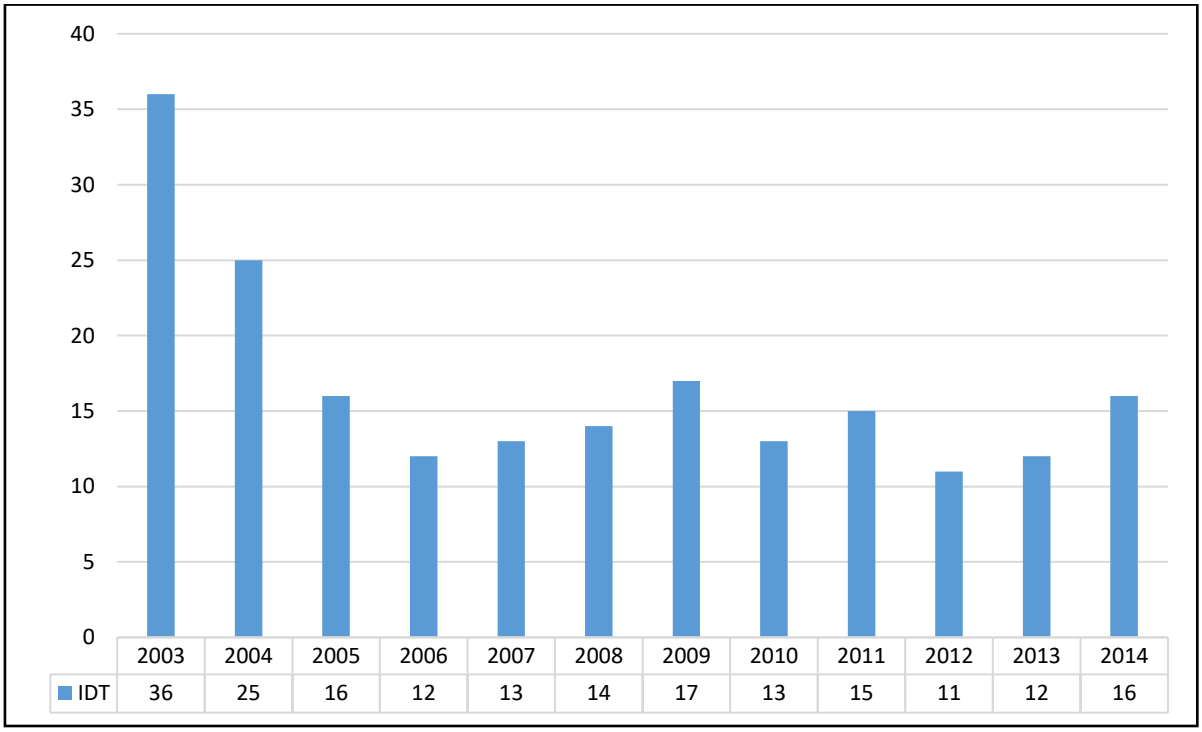
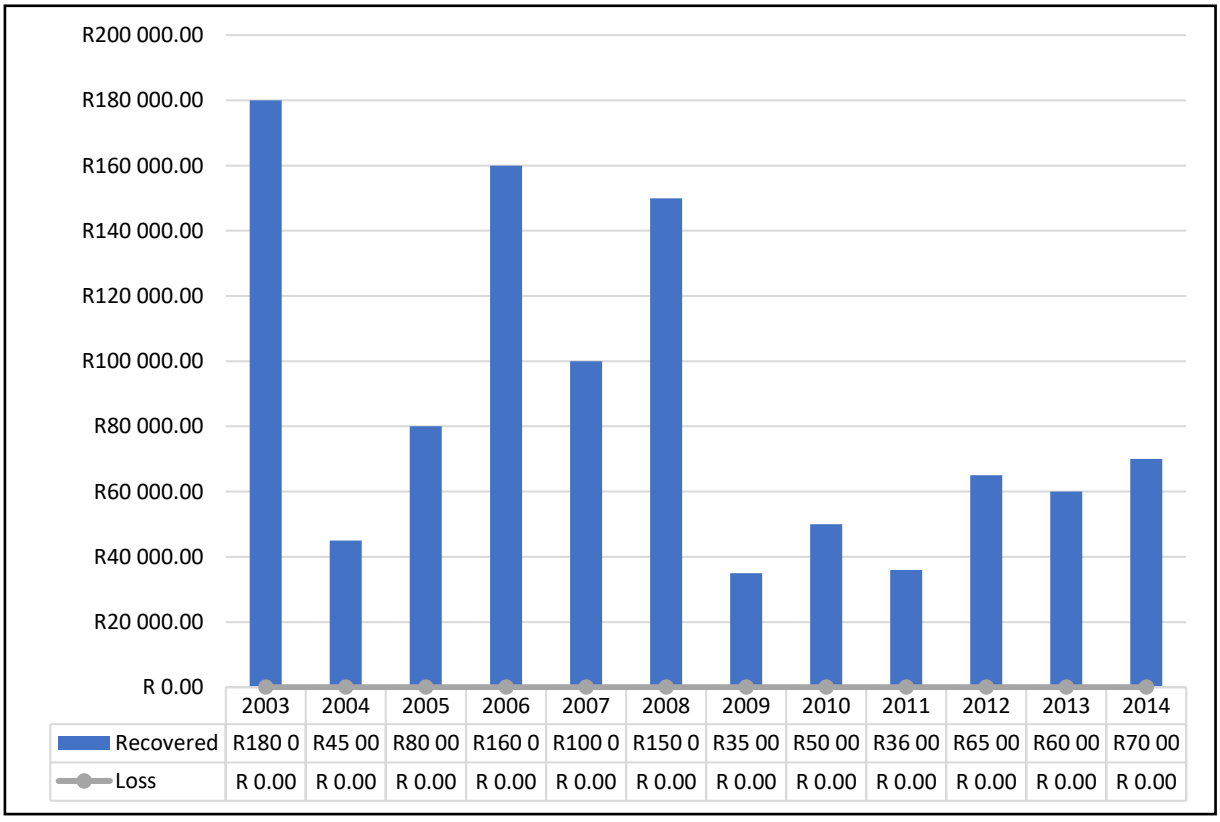


Figure 4.2: Financial recoveries and losses of investigated cases at Cullinan Diamond Mine (2003-2004)



The sample of investigated cases at Cullinan Diamond Mine for the period 2003-2014 resulted in the total recovery of R1 031000.00. In the sample of cases perused no loss is indicated, this is as a result of the fact that diamonds in the mining environment could be found anywhere within the diamond value chain unless if in a closely controlled environment. In all the case dockets perused no diamonds were stolen from a safe or vault. The value of the diamond recovered only reflect instances where diamonds were found, because it is the view of the researcher that the suspects arrested would have been involved in other undetected incidents of diamond theft before.

Image 4.1: Parcel of nine pieces of diamond recovered from a suspect during an arrest in 2003

The above image is 9 pieces of diamonds received from a mine employee during an arrest in 2003 with a value of R15 500.00. The diamonds were confirmed to have been stolen from Cullinan Diamond Mine within the diamond value chain by the suspect. The employee involved hid the diamond in his body when exiting the mine knowing that the security system at the exit point would not pick up the diamonds. The arrest of the employee would not have been possible if it was not for intelligence providing the information (Cullinan Diamond Mine, 2003).

Image 4.2: A parcel of one diamond wrapped in a piece of newspaper retrieved during an arrest in 2007 Case no. 56/2007

The above image is a parcel retrieved from an employee during an arrest on mine in 2007. The value of the diamond which weight 7ct (carats) was valued at R26000.00. Once the arrest of this employee would not have been possible if it was not for intelligence information provided to security. During this incident the employee involved used a different route to smuggle the diamond out of a controlled environment making it difficult for security cameras to pick this incident up. The employee involved was disciplined and subsequently dismissed from the mine. A case was reported to the police and the employee received a five-year suspended sentence for the offence (Cullinan Diamond Mine, 2007).

Image 4.3: A parcel of 11 diamonds embedded in press stick retrieved during an arrest in 2008 at Cullinan Diamond Mine Case no. 47/2008

The above image is diamond retrieved during an arrest at Cullinan diamond mine in which two a contract employee colluded with a contract security officer in smuggling diamonds out of the mine. The arrest would not have been possible if it was not for intelligence information which highlighted the plan by the two individuals. The parcel of the eleven pieces of diamonds was embedded in a piece of press stick in which the diamonds were inserted in an ear plug used on mine to protect ears from being damage from noisy areas. The employees were caught in possession of the parcel and admitted to the offence. Both employees were arrested and handed over to the police for prosecution and the employees received 8 years jail sentence for the offence. The value of the diamond was R1500.00 SAPS 47/04/2008.

Table 4.3: The number of employees, contractors and security officers arrested and dismissed for illicit diamond trading at Cullinan Diamond Mine (2003-2014)

Employees	Contractors	Security Officers
13	7	2

A total of 22 individuals were arrested and dismissed at Cullinan Diamond Mine for the period 2003-2204 as a result of being involved in illicit diamond trading. The dismissed individuals included 13 employees, 7 contract employees and 2 security officers. All these cases were driven by intelligence information which was provided. The above analysis clearly indicates the importance of intelligence in combatting diamond theft at Cullinan Diamond Mine.

Table 4.4: The number of suspects identified from the sample of cases investigated at Cullinan Diamond Mine (2003-2004)

Employees	Contractors	Security officers
18	14	3

From the sample of cases investigated at Cullinan Diamond Mine a total of 35 suspects were highlighted during the investigations although not enough evidence to pursue any disciplinary measures against the individuals concern. The researcher is of the view that with all the security measures in place at Cullinan Diamond Mine the individuals identified would be addressed. The researcher also believe that the role played by intelligence has been key in addressing the threat faced by Cullinan Diamond Mine.

One-on-one interviews

The researcher conducted a total of 30 one-on-one interviews for the purpose of the study. The respondents were selected on the base of their experience in the diamond value chain to ensure that the response does add value to the study. The participants including both male and female involved in different stages of the diamond value chain.

The researcher explained to each participants the purpose of the study to ensure that the participants understood what was expected from their participation. A consent form was signed by each participant before the resumption of interviews. During the interviews the researcher took handwritten notes and also made audio recording for the purpose of analysis.

The researcher, as part of the study, selected and interviewed employees who have been in the employ of the company for several years in order to draw from their experience at different process levels. In relation to the views of the participants, the researcher examined the risks in the process through a risk assessment and examine existing security measures.

Interviews are a ubiquitous way of collecting data for research purposes and many qualitative projects use only one-on-one interviews as their source of collecting data. (Packer, 2011: 42).

The researcher must further consider the questions to be asked before interviews are conducted (Lutz & Knox, 2014: 343).

Participants in the same stages of the diamond value chain where asked similar question for the purpose of evaluating responses. Responses of participants were evaluated against each other in order to test correctness and accuracy. Not all participants were asked similar questions since not all participants are involved in the same stage of the diamond value chain.

The researcher believes that the interviews assisted in achieving the objective of the study through the value of the responses received from participants.

The findings of this study are based on primary questions asked during interviews with the participants who are directly involved in the diamond value system at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines. The findings also include information collected by the researcher during a plant visit.

4.2 INTERPRETATION OF RESEARCH FINDINGS

4.2.1 Primary research question

The primary research question posed to the 30 participants in these one-on-one interviews was the following:

What value has the use of informers has had in preventing diamond theft?

Deduction

All the participants have had over ten years working experience within the diamond value chain at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines.

This study revealed that using informers has played an important role in the prevention of diamond theft at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines.

This study further indicated that information received through informers, has resulted in police actions in which mine employees and none mine employees were arrested by the police and successfully prosecuted. The use of informers on the mines has also resulted in security officials being arrested who colluded with mine employees in smuggling diamonds from the mine.

Participants gender

A total of 30 respondents were selected for the purpose of the study and from these respondents four were females and 26 males. During the selection process the researcher considered all employees with over ten years of working experience in the diamonds value chain who could add value to the objective of the study and most of these participants who met the criteria were male. The researcher did not exclude woman or male for whatever reason other than the ten years working experience in the diamond value chain process.

The use of informers has also assisted security at Cullinan Diamond Mine security to successfully arrest copper theft syndicates on the mine. Informers have also assisted the investigation function at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa

Mining Joint Venture diamond mines to successfully discipline employees who have breached security policies and procedures. In the diamond value chain, informers have provided answers to technical challenges experienced in the system such as breakdowns, production delays and blockages.

The use of informers has also assisted the security function in identifying external threats to the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines and assisted management in making informed decisions. Informers have assisted the Security Department in directing security operations aimed at preventing diamond theft, copper theft and general protection of company assets.

Four participants confirmed during the interviews that intelligence received has assisted in preventing diamond theft. One participant confirmed having seen employees looking around in diamond-bearing ground during chokes/ blocking of ground in systems. It is for these reasons that tactical intelligence becomes important to identify loops and weaknesses in the system.

In this study, during the interviews, Respondents Nos. 3 and 12 (2016) and Nos. 27 and 28 (2017) indicated that using informers, police were able to initiate police projects, whereby they conducted ‘buy-and-busts’ operations at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines. The participants stated that the police actions were successfully administered resulting in the arrest and conviction of some employees. The participants also indicated that the Security Department at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines conducted security operations as a result of intelligence information and that the operations led to the successful arrest of employees involved in illicit diamond trading.

Without intelligence information, the actions by the police would not have been possible. Respondent Nos. 7, 8, 10, 11 & 13 (2016) and No. 29 (2017) believe that the security intelligence team needs to develop a close working relationship with the rest of the security functions on the mines, for these other functions to play a role in assisting the intelligence network team. The participants further indicated that is it very

important for the general employees in the diamond value chain to be educated about the risks and vulnerabilities in the system for these employees to appreciate the importance of security and play a role.

The use of informers in preventing crime is an accepted practice internationally. In South Africa, the use of informers is regulated in terms of the Constitution of the Republic of South Africa 108 of 1994 and the National strategic intelligence Act 39 of 1994. At Petra Diamond Southern Africa, the security intelligence function is regulated in terms of the PDSA-INTEL-01 policy.

4.2.2 First secondary research question

The ancillary question posed to interviewees as a follow up to the primary research question was the following:

> ***Has data interpretation by security data analysts added any value to the prevention and combating of diamond theft (at diamond mines)?***

Interpretation and deduction

Data interpretation has assisted the Security Department to focus its effort in the right direction by pointing out problematic areas in the diamond value chain system. The interpretation of data has also assisted the Security Department by pointing out areas in the system where there are frequent chokes in the system, spillage which could result in diamond theft. The trends from analysis has identified areas around the mine perimeters which criminals were exploiting and resulting in security initiating operations to arrest the perpetrators.

It was established that information collected by the security intelligence collectors is tested for accuracy. During the interview, Respondent No. 7 (2016) indicated that information received from intelligence is not always correct. The intelligence information garnered, must be as accurate as possible, before being passed on to the consumer. It is important to ensure that information collected is credible and reliable and corroborated before it is used Flynn (2009: 76). Information recorded from the production systems at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines and all security-related incidents captured, are as far as

possible accurate. Inaccurate information captured will not assist in building a true picture of what is happening. The response by Respondent No. 7 (2016) was, however, not corroborated by other participants during this study.

Intelligence analysis is a process which involves the interpretation of information about the adversaries or environment for the purpose of decision-making, according Marrin (2011:1). The security data analyst must support decision-making at Cullinan Diamond Mine. For the purpose of this study the end-product of analysis must support intelligence-led solutions on mines. All production related incidents and all security related incidents must support the security manager in identifying trends in the systems, suspicious behaviour, vulnerabilities and production delays which impact negatively on the diamond value chain.

During the interviews, Respondent Nos. 7, 8, 11, 12 and 13 (2016) and No. 29 (2017) confirmed that intelligence received, has assisted in the prevention of diamond theft at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines. The above participants further confirmed that trends received have assisted in preventing some diamond theft at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines.

Participant 8 also indicated that trends only does not add value, but it is in the way that the information is used. Intelligence information is at times not implemented, because the customer does not understand the intelligence.

The trends picked up by the security data analyst during analysis does add value to the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines.

During the interviews, Respondents No. 3, 6, 7 and 12 (2016) and Nos. 24, 27 and 28 (2017) were asked by the researcher what process they follow to verify information from various sources with regards to diamond theft.

The answers from the above participants were recorded as follows with the information being treated with:

- Confidentiality;
- The information is formally recorded on the electronic data base;
- The information is verified using other independent sources both human sources and technological sources;
- Verified through available information, electronic data base;
- Use of the traditional intelligence cycle; and
- Investigated and feedback given to the caller if the caller gave his/her details.

Rolington (2013:23) defines information as unprocessed data which must be checked for gaps and verified by cross-referencing to other sources, as it is analysed and gradually becomes intelligence ready to be handed over to the consumer. There is no direct interaction between the security data analyst and the consumer of intelligence. The disconnect between the analyst and the consumer of intelligence results in the intelligence provided not being either understood or recommendations not being implemented.

The information loaded on the security data base from which the analyst works is not always accurate or complete, resulting in delays during analysis and inaccurate intelligence provided to the consumer. The consumers of intelligence information are of the view that they are not trusted by the intelligence section as they are prevented from participating in developing or analysing the intelligence.

During the interviews, Respondent No. 6 (2016) was asked what data/information is captured in the diamond value chain for the purpose of analysis and the answers were recorded as follows:

- All production related incidents which includes blockages of systems where diamond-bearing ground runs;

- Spillages of diamond-bearing ground;

- Breakdowns in the diamond-bearing systems;

- Anything which affects production negatively; and

- All security related incidents within the diamond value chain which include broken seals, breach of fence, suspicious behaviour of employees in the plants, breach of security policies and procedures, reported cases and theft incidents.

Respondent No. 6 (2016) further indicated that an electronic data base system is used to record crime incidents on mine.

Respondent No. 12 (2016) indicated that the electronic data base system is an incident driven reporting system which the operations use to report occurrences and security incidents. The participant further indicated that the system is a data base for intelligence.

The traditional intelligence cycle currently used at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines comprises of five stages, namely:

1. Planning;
2. Direction;
3. Collection; and
4. Processing.

The flow of intelligence is of paramount important in a diamond mine environment for the security manager to successfully prevent diamond theft. Communicating trends picked up by the security data analysis play a key role for the security managers of the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines. The security managers and other stake holders directly tasked with protecting diamond theft on the mines and closing loops in the diamond value, chain need to be kept in the loop of intelligence pointing to the vulnerabilities in the system.

During the interview Respondent No. 6 (2016) was asked how data is captured, analysed and disseminated and the response was as follows:

- The plant security personnel have a book in which they record all the security incidents, for example: spillage of diamond-bearing ground, breakdown of production systems, glove changes, blockages of system carrying diamond-bearing ground and open handling of diamond-bearing ground;

- The information received gets captured on a security electronic data base;

- The electronic system on which all information is stored for future use and reference;

- Information captured on the data base is used to build trends. Information collected through sources also gets captured on the data base; and

- Intelligence cycle is used to analyse information capture and during this process there is a constant communication between the security data analyst and the collectors of information. Intelligence is disseminated via reports to the customers.

The process followed in capturing, processing and dissemination of intelligence is in line with intelligence standards and practices.

During the interview Respondent No. 6 (2016) indicated that during the process of analysis, there is intercommunication between the collector of intelligence and the security data analyst. The current intelligence process used in verifying information needs to be reviewed, as it does not include the consumer of intelligence who feeds into the current notion that some functions within the security functions at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines are not being trusted.

4.2.3 Second secondary research question

An additional secondary research question was then posed to all interviewees, namely:

> ***What are the risks or threats that Cullinan Diamond Mine faces in relation to diamond theft during the mining process?***

Deduction

A total of 30 participants participated in the question for the purpose of this study. The areas covered by the participants include the blue, pink and red areas, which are all areas through which the diamonds value chain flows.

During the interviews, the above participants were asked how often contact with diamond-bearing ground occurs in a shift and the answers were recorded as follows:

- Contact with diamond bearing ground occurs throughout the shift for various reasons, which includes when blockages in the system of the diamonds value chain occur, such as in pipes, pipe conveyors, screen panels and feed chutes. Contact also occurs during operational requirements, such as where the material is transported manually from one system to the other systems in the diamonds value chain. Contact also occurs during spillage of diamond-bearing ground where the material ended up outside the diamond value chain system and at breakdowns in the diamond-bearing ground system in which the system fails or ceased due to wear and tear.

The participants indicated that these challenges are applicable to the red, blue and pink areas.

Respondent No. 2 (2016) from Cullinan Diamond Mine, stated that underground employees are always in contact with the diamond-bearing ground, however the ground at this stage of the process is still diluted. The participant further indicated that the only way to find diamonds would be to physically scratch in the diamond-bearing ground.

Respondent No.1 (2016) from Cullinan Diamond Mine, stated that the nature of his work requires that the participants are in contact with the diamond-bearing ground daily. This participant indicated that the purpose to be in contact with the diamond-bearing ground, is to determine which ground should be mined in order to achieve the carats' target set in a month.

Respondent No. 7 (2016) from Cullinan Diamond Mine indicated that contact with diamond-bearing material occurs about five times in a shift for various reasons which includes design of the diamond-bearing systems and outdated technology in some instances. The participant indicated that this challenge is being addressed through new technology.

Respondent No. 8 (2016) from Cullinan Diamond Mine, stated that any contact with diamond-bearing material in the blue, pink and red areas are treated as an anomaly and not a norm. According to this participant, where an employee has come into contact with the material, this instance gets recorded by security as an incident.

During the interviews, all the respondents confirmed that the mining and plant process involve technological systems and physical labour. The participants indicated that in some instances employees are required to used shovels or their hands to unchoke / unblock certain systems carrying the diamond-bearing ground.

As a result of the challenges experienced in the diamond value process and the nature of the process, it is expected that employees will always come into contact with diamond-bearing ground. The researcher believes that under these circumstances, intelligence-led solutions and the use of technological based solutions could assist in preventing diamond theft. The integrity of individual employees becomes very important in ensuring that employees do not get tempted to steal in an event that an employee notices a diamond during his/her normal routine.

In this study the researcher, is of the view that the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines could benefit from the use of intelligence-led solutions given the nature of the operations and the fact that employees are exposed to diamond-bearing ground daily.

During the interview, all 30 participants were asked if they had ever seen employees scratching illegally in diamond-bearing ground and the answers were recorded as follows:

Two respondents, Nos. 1 and 3, (2016) confirmed having seen employees scratching in diamond-bearing ground illegally. One participant confirmed having seen evidence of persons scratching illegally in diamond bearing ground, underground. Another participant indicated that he has been involved in several cases brought to the fore for investigation. One other participant indicated that during blockages in the diamond value chain he would always encourage employees to stop looking at the diamond-bearing ground. Five respondents indicated that they have not seen any employee scratching in diamond-bearing ground. Two respondents indicated that they have not personally seen employees scratching illegally in diamond bearing ground, but they have been involved in cases where video recordings were presented as evidence in the hearings. The rest of the respondents indicated that they have not seen an employee's scratching. The question was not applicable to one respondent.

Illegal scratching in diamond-bearing ground is a reality at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines. Intelligence-led solutions and the use of technology is the solution to this challenge.

Based on the above responses it can therefore be safely assumed that more employees could be scratching in diamond-bearing ground both on surface and underground but have not be caught or seen.

Respondent No. 4 (2016) indicated that all employees who were reported for scratching illegally in diamond-bearing ground and taken to a disciplinary hearing for the violation, were dismissed successfully. According to the Diamond Security Policy of Cullinan Diamond Mine PDSA-SPP-01, (2009) there are strict rules around handling of Kimberlite ground listed as follows in the policy:

> "It is not permitted for any person to sort or to scratch in concentrate or Kimberlite unless such activities fall within the scope of the person's work. It is not permitted for any person to recover unpolished diamonds using fishing tools or other self-enrichment devices such as sieves, containers adapted for sieving, lubricating grease, cloth, rubber impregnated with grease, etc. Sorting and/or open handling of concentrate, kimberlite or any gravel spillage is strictly prohibited, unless authorization is given by the Security Manager/Head of Security. Sorting may only take place in the Sort house by authorized personnel. Any person seen to be sorting, scratching or tampering with concentrate, kimberlite or gravel spillage in the abovementioned areas render themselves liable to dismissal, and legal action (PDSA-SPP-01, 2009).

The intelligence collector must be able to support the policy in enforcing compliance. The researcher believes that the intelligence collector should be able to inform decision-makers if employees are not complying with the policy as stipulated above.

The lack of support provided to the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines from the SAPS in addressing illicit diamond trading around the mine areas, poses a serious threat to these operations.

A collusion between security personnel and mine employees renders the security system weaker. Previous internal cases have proved the reality of a collusion between security officers and the plant personnel posing a serious threat to the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines.

Security personnel, not familiar with the risks within the diamond value system, makes it difficult to adequately prevent diamond theft. No programme is in place to ensure that the plant security personnel are well informed about the risks within the diamond value system. Use of water underground and in the plant, resulting in diamond-bearing material being cleaned in the process makes the diamonds more visible and easier to see.

There is a lack of close working relations between the intelligence section and the customers of intelligence information who are entrusted with the protection of diamonds and who oversee production operations. The relationship between the security intelligence section and the client who receive intelligence is not favourable to allow for an open and frank interaction. The intelligence section members must better understand the challenges experienced in the diamond value system.

The customers of the intelligence do not understand the role which intelligence could play in their respective departments, within the diamond value chain, to support the efforts of preventing diamond theft and enhance production. There is a lack of security awareness campaigns to continuously encourage employees to report criminal acts to the security department. Some employees are not aware how to report information to security and the benefits thereof.

In this study during the interviews, four participants were asked what security control measures are in place in the diamond value chain to prevent unauthorised scratching in diamond-bearing material. The answers of the participants were recorded as follows-

- CDM-SEC-29. 2009. Diamond security policy and procedures
- CDM-SEC-05. 2008. Access Control
- CDM-SEC-20. 2008. X-ray scan operating procedure
- CDM-SEC-08. 2008. Surveillance
- PDSA-INTEL-02. 2009.Vetting Policy
- PDSA-INTEL-01. 2009. Security Intelligence Policy

The participants indicated that the policies prescribe what employees may and may not do when handling diamond-bearing ground. According to the participants the policies indicate who may have access to what area and the profile of the person concerned. The participants also indicated that the policies encourage employees to report any criminal act to the security department.

The Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines have reasonable measures in place to assist in the prevention of diamond theft on mine. In order to ensure that these policies are adhered to by all employees, the intelligence collection team must be able to inform the authorities when these policies and procedures are violated by employees. Respondent No. 3 (2016) indicated that during a security operation at Cullinan Diamond Mine a security officer was arrested for colluding with plant employees in stealing diamonds from the mine.

During the interviews the participants were asked to identify vulnerabilities which they think could contribute to diamond theft during their processes and the answers were recorded as follows:

- Blue area: Underground;
- Contact with diamond-bearing material during routines;
- Testing phase of the diamond-bearing material;
- Pick up of diamonds by an employee due to the availability of diamond-bearing material; and
- Cleaning of tunnel by use of water.

Respondent No. 10 (2016) stated that although the concentration of diamonds is extremely low underground in terms of the carats per hundred ton, an employee who has time, would be able to recover diamonds in this area. The participant further indicated that the underground environment must not be underestimated in terms of employees being able to pick up diamonds. Respondent No. 3 (2016) indicated that there have been several pickups which employees reported from the underground environment from time-to-time. Even though the underground environment has a low concentration of diamonds, as indicated by the participants, diamonds could still be picked up in the environment. Activities which pose an opportunity for diamond theft in different areas on diamond mines include the following, namely:

Pink area: Plant

- Open handling of diamond-bearing material due to operational requirements;
- Unblocking of channels or chokes/bottlenecks in the system;
- Employees with bad profiles;
- Spillage of diamond-bearing material;
- Overfeeding of diamond-diamond bearing material into systems;
- Incorrect design of systems in the diamond value chain;
- Use of grease, which could lead to employees using it for personal agendas;
- Technology failure and inefficiency from time-to-time;
- Seal control by security;
- Access control into diamond-bearing systems or areas;
- Screen panels which are blinded (choking), forcing employees to use a tool to unblind it or hands wearing gloves; and
- Poor design of systems which could result in the occurrence of diamond theft.

Red area: Recovery and sort house

- Scrap or waste removal out of the red area process;
- Collusion between security officials and plant personnel;
- Holes in the pipes running diamond-bearing material in the sorting house;
- Tailing material, despite the separation process there is always a chance that a diamond could be found in the tailing material;
- Open handling of diamond-bearing material due to operational requirements;
- Unblocking of pipes or chokes in the system;
- Employees with bad profiles;
- Spillage;
- Overfeeding;
- Poor design of systems which could result in diamond theft;
- Incorrect design of systems in the diamond value chain;
- Use of grease;
- Technology failure and inefficiency from time-to-time;
- Seal control by security;
- Access control;
- Access to X-ray machines which separate diamond-bearing machines; and

- Manipulation of systems by employees to render them inefficient in order to throw diamonds out of the area.

Respondent No. 3 (2016) stated that decision making by management is a problem when it comes to implementing security measures to close down the loops identified by intelligence. The participant further stated that despite the scrap removal process being a loop, not much has been done to ensure that the process is closely monitored and controlled. The participant further indicated that in the past a security officer was arrested for colluding with plant employees to steal diamonds from the red area. According to the participant the greatest risk in the area is collusion.

Respondent No. 13 (2016) stated that the Security Department must do regular tests on the security systems to determine if the systems work according to the standards designed for.

Given the risk identified by the participants that it would always be a challenge to totally prevent employees from coming into contact with diamond-bearing material**.** In this regard the researcher is of the view that a closely coordinated effort between various security functions is of critical importance and in this regard the intelligence collection team must provide guidance. It is the experience of the researcher over the 12 years at Cullinan that preventing diamond theft becomes easier when the security manager understands the trends, as this also assists in policy formulation to further enhance security measures.

In order to address criminal acts in the diamond value system, the implementer of the security measures first needs to understand the risks involved. The researcher believes that the security measures to be implemented must address the risks identified, otherwise there would not be a return on investment.

During the interviews, the participants were asked if they thought that competency plays a role in preventing diamond theft and the answers were recorded as follows:

- All participants indicated that competence does play an important role in preventing diamond theft.

- The participants stated that only when an employee can identify loops and understand the process would he/she be able to close loops which could lead to opportunities for diamond theft.

- The participants further indicated that if an employee is unable to detect a risk, it would be difficult to prevent diamond theft.

According to Respondent No. 11 (2016) security must understand the diamond value chain more than the plant personnel. The participant further indicated that he has picked up that security does not understand the process, this is a concern for him.

Respondent Nos. 3 and 13 (2016) and No. 14 (2017) all indicated that the security officers working at the plant does not understand the process and the risks involved. The participants indicated that a few years back, there was a training programme for all security officers on mine to teach them about the process and risks. This programme has since been abandoned.

For the Security Department to prevent diamond theft, they need to understand the diamond value chain and the risks. The security intelligence section has a significant role to play in gathering of information around threats and risks in order to inform on policy issues including training of security personnel. Only through a good understanding of the diamond value chain and the risks involved, can security prevent diamond theft. Despite all security measures and policies put in place, criminals and employees with bad intentions will always find a way to bypass the systems. In this regard, the intelligence security section through human sources needs to play an important role at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines.

4.2.4 Third secondary research question

A further ancillary question was posed to interviewees, namely:

> ***What intelligence processes and systems are being adopted and implemented by the intelligence collection team to prevent and combat diamond theft?***

Deduction

The Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines have several security systems to ensure the prevention and combating of diamond theft.

The vetting policy ensures that only employees with correct profiles are recruited. The policy allows for employees working in high risk areas to be screened annually and also subjected to the polygraph examination tests. Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines use informers to provide information on illicit acts on the mines which includes diamond theft.

The Anonymous tip-off, in which employees are encouraged to report criminal acts telephonically or through an email, is one of the systems used at the mines. A reward system is in place to encourage employees to report illicit acts on the mines which includes diamond theft. CCTV systems, Access control system (ID cards) and X-rays are also used to assist security in the prevention of diamond theft. The ŀogging of all security incidents by security officials on the electronic data base including production incidents, investigations and informer information report for analysis purposes are also used by the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines. They also use the traditional intelligence cycle to process information. However, the intelligence cycle used to process information does not include the consumers of intelligence which could result in mistrust between the consumer and the producer of intelligence.

The Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines have a diamond security policy and procedure in place which regulates the handling of diamond-bearing material on these mines. All 30 participants

interviewed indicated that not all employees are aware of the content of the policy. It is a fact that not all employees understand and know the content of the policy already poses a challenge to the effort of preventing diamonds theft.

During the interviews, nine of the 30 participants were asked if security intelligence received in the past has assisted in the prevention of diamonds theft and the answers were recorded as follows-

Table 4.5: Statistical results of intelligence value at Cullinan Diamond Mine

No. of respondents	Yes	No	Not Sure
25	X		
4			X
1		X	

Twenty-five of the respondents confirmed that intelligence information received had assisted in the prevention of diamond theft. Four respondents further commented that the intelligence collection team needs to be more pro-active in its approach. These participants indicated that the security intelligence team must stop relying so much on the police. The gathering of intelligence must focus more internally for the prevention diamond theft. These respondents indicated that the information gathered, is not always correct, because the informer and the handler does not always understand the diamond value chain process in order to identify risks in the system. Respondent No. 8 (2016) indicated that intelligence received did not assist in the prevention of the diamond theft. The participant made the following observation that the security intelligence team does not communicate intelligence. The intelligence collection team does not trust employees from other departments. The security intelligence section behaves like the secret service. The intelligence section must begin to trust people so that it could be assisted to do their jobs better.

It is clear from the responses provided by the nine participants that intelligence received has assisted in the prevention of diamond theft at Cullinan diamond theft.

Despite the responses, there is still a need for the security intelligence to review processes particularly around the process followed in verifying information.

Secrecy is a good practice for the intelligence practice, because intelligence collectors knows that security intelligence is most productive when the target does not know that it is being watched (Dover, Goodman & Hillebrand, 2014: 42). The producer of intelligence needs to balance communication with the consumers of intelligence. Intelligence must however be communicated on a need to know. The consumer of intelligence must be identified properly and briefed accordingly in order to inform on decisions.

During the interviews, the participants were asked if they thought that the engineering design played a role in preventing diamond theft and the reposes were recorded as follows:

All the participants agreed that the engineering design plays an important role in preventing diamond theft. The participants stated that the way the feed chute, conveyors belts and screens in the plant are designed assist in preventing spillage of material which could result in theft.

Participant 5 indicated that the design of the sorting table where the diamond-bearing material is separated in the sort house, is very important to prevent diamond theft. The participant stated that pipes running into the table must be limited and holes in the sorting table must be prevented. The participant further indicated that the hole made on the table and where the pipe is fitted in, must fit exactly to avoid any space created which individual employees could exploit to steal diamonds.

The security department's representative needs to understand and be familiar with all processes in order to successfully prevent diamond theft. Where there are issues of design which could create a risk, appropriate security measures must be implemented. In order to implement workable solutions, the intelligence collection team must be able to pre-warn of risk issues so that the measures implemented, address the risk.

4.2.5 The fourth secondary research question

A further ancillary question was posed to interviewees, namely:

> ***What* [diamond theft] *trends have been confirmed through internal security operations conducted?***

Deduction

Criminals and employees with bad intentions would always recruit a security official to provide information on the system. Some employees are likely to steal diamonds if an opportunity arises during the normal work routine. Syndicates and individuals outside the mine are likely to use some of the employees at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines to collect diamonds from the mine. Syndicates and individuals are also likely to use some employees from the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines to gather information for criminal acts against the Cullinan Diamond Mine (Respondent Nos. 3,6, & 12, 2016; & Respondent No. 27, 2017).

Some employees will always find a way to bypass security systems over time with experience in an area. Employees always familiarise themselves with CCTV positions in an area and find a way to bypass the system. Security personnel are likely to provide information on security systems deliberately and at times are unaware to plant personnel or people outside the mine environment, making the security system vulnerable to attack. An employee who steals a diamond from the Cullinan Diamond Mine does not test if what he/she picks up is a diamond or not. This is something he/she only confirms outside of the mine environment which results in some objects being false (not a proven diamond) when an employee is arrested by the police. In other words, there is no ‘hard’ evidence that a genuine diamond has been stolen from the mine. Working in diamond-bearing ground always provides an opportunity for diamond theft (Respondents Nos. 3, 6, 8, 10 & 12, 2016; & Nos. 27 & 28, 2017).

Vetting

The objective of the vetting policy is to ensure that all employees, contractors, visitors and organisations are properly vetted prior to and during work/employment/conducting business with and or having access to (PDSA-INTEL-02, 2012). This policy covers all

mining operations owned by Petra Diamonds, which includes the Cullinan Diamond Mine.

During the interviews two participants were asked what process is used to prevent criminals from infiltrating the system. Both participants indicated that the company uses the vetting policy to screen all potential employees, organisations, contractors and visitors before granting them access to the mine. The participants indicated that during the process, due consideration of the following laws is taken:

- Constitution of the Republic of South Africa 1996;
- Labour Relation Act 66 of 1995;
- Employment Equity Act 55 of 1998; and
- Skills Development Act 97 of 1998.

Various written policies and procedures are kept at the mine namely:

- Employment contract;
- Code of Business Conduct and Ethics;
- A-PDSA-02 Security Vetting Consent, Indemnity and Waiver of Claims Forms;
- B-PDSA-02 Declaration by Applicant annexure C-PDSA-02 Confidentiality undertaking; and
- D-PDSA-02 Security Vetting Process and reps/ Annexure E-PDSA-02 Security Vetting App for Rev.

In this study it is the view of the researcher that Cullinan Diamond Mine, Finsch Diamond Mine, Koffiefontein Diamond Mine and Kimberley Ekapa Mining Joint Venture, have the necessary systems in place to prevent criminals from infiltrating the systems. It is the opinion of the researcher that despite all systems put in place, criminals could always fake identities and infiltrate the system and therefore it is the role of intelligence-led team to provide the necessary security intelligence on new trends. A thorough vetting/screening of potential employees, contractors and visitors plays a key role in preventing criminals from infiltrating the company system.

The Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines all use the vetting system to ensure that syndicates and individuals with bad profiles do not access the system of Cullinan Diamond Mine. Through the

vetting system, potential employees and current employees are screened. The screening includes screening of qualifications and the employee's criminal record status. An employee is required to give written permission before the screening is conducted by the security intelligence section.

Anonymous tip-off line

The have the anonymous tip-off line in place through which the company and the Security Department encourage employees to report criminals acts anonymously.

During the interviews, the participants were asked if they believed if employees in their sections were well informed about the toll-free crime line aimed at encouraging employees to report suspicious behaviour and theft of diamond incidents. The responses of the participants were recorded as follows:

Fifteen participants indicated that most employees on the mine know about the toll-free crime line. Five participants indicated that they 'think so' [employees know about the toll-free line] since the number is displayed across the mine notice boards and in the tea rooms. The participants further stated that it also had to do with the willingness of the employees to report illicit acts. The participants indicated that an awareness campaign of the numbers must be done regularly. Respondent No. 10, (2016) indicated that information on the toll-free crime line is regularly briefed on the mine communication brief called 'GM's Brief'.

A better awareness campaign by the Security Department must be conducted throughout the mine, to constantly make employees aware about the toll-free crime line and the negative impact of diamond theft on the existence of the company Diamond theft can only be prevented successfully if all the role-players participate in the fight. In this study role-players include all employees on the mine, irrespective of position or status (Respondent No.12, 2016).

Rewards

The Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines have a reward system through which employees are encouraged to report criminals' acts or behaviour contrary to policies and procedures. The reward

paid to the employee is dependent on the accuracy of the information, value of the information and importance of the crime. All respondents indicated that a reward is paid to employees who come forward with information regarding any illicit act on the mine which includes diamond theft.

Internal case dockets analysis

The 200 cases of illicit diamond trading perused by the researcher 2003-2004 revealed the following. All diamond theft cases investigated at Cullinan Diamond Mine was as a result information received from intelligence. The absence of intelligence at Cullinan Diamond Mine would have meant that the Security Department would not have been aware of the incidents successfully. It is impossible for the Security Department to know when a diamond is stolen from a diamond value system unless the diamond is already recovered and locked away, therefore making it difficult for Cullinan Diamond Mine security to compare or determine the value of diamonds lost through theft versus diamonds recovered during arrests.

The availability of diamonds in the diamond value chain creates an opportunity for theft to some employees. Employees working in specific stages of the diamond value chain over a period get to understand the weaknesses of a security system and exploit it for theft of diamonds.

The sample of cases perused indicates that employee collusion with security remain the biggest challenge for the security system at Cullinan Diamond Mine. In all cases investigated suspects arrested first invested an amount of time in first understanding how the security system was set up both at the exit points and in specific stages of the diamond value chain.

Diamonds are in nature very small as a result making it very easy to hide through various forms or on the body. The use of technology such as covert cameras linked with intelligence has been the driving force for diamond theft arrest at Cullinan 2003-2004. The Security Department at Cullinan Diamond Mine have been able to prove cases successfully in disciplinary hearings primarily because of the information from intelligence and covert cameras installed in specific stages of the diamond value chain.

4.3 CONCLUSION

Questions between various participants were compared and statistically presented to determine accuracy of responses given. During the interviews the experiences of the participants in the diamond value chain provided valuable information to assist in the achievement of the objective of this study. All participants provided honest answers to all questions asked during the interviews.

Diamond theft was confirmed to be a challenge for the Cullinan Diamond Mine. The fact that employees, during their normal work routine, are in contact with diamond bearing material, does not make it easy for security to totally stop diamond theft at Cullinan Diamond Mine.

Although security systems are in place at Cullinan Diamond Mine what appeared to be a problem for the participants was the relationship between various functions within the security department. Support from the SAPS to Cullinan Diamond Mine is a challenge in that despite several suspects arrested for diamond theft and identified very little evidence exists that the police has addressed the illicit diamond market around Cullinan Diamond Mine. Cases perused 2003-2004 indicates an increase of new individuals coming into the space of illicit market which suggest that the market does not feel the brunt of the law. The fact that the illicit market remains unchallenged ensures continued recruitment of employees to supply the market.

Regular engagement between the South African Police Service (SAPS) on challenges faced by Cullinan Diamond Mine appear very minimal. The police are only called when there is an arrest made by security at Cullinan Diamond Mine but no meetings or workshops are held to discuss learnings and solutions going forward.

This chapter dealt with the interpretation and findings of the data collected. Chapter 5 will deal solely with the recommendations emanating from the findings of the research study.

CHAPTER 5
RECOMMENDATIONS AND CONCLUSIONS

5.1 INTRODUCTION

Chapter 1 of the research study outlined the rationale, problem statement and aims of the research. Chapter 2 of the research presented the research methodology of this study. Chapter 3 of this study dealt with data collection for this study and the challenges presented by diamond theft as experienced by Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines and other Petra diamond mine operations in South Africa. In Chapter 4 the findings of the research study were discussed and outlined. Chapter 5 will focus on this study recommendations.

The recommendations of this study are based on the findings that emanated from the participants' responses. The researcher is of the opinion that in order to ensure that the security measures which have been put in place will assist in the prevention of diamond theft at Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines, the following recommendations are necessary.

5.2 RECOMMENDATIONS

The following are recommended for implementation by the Cullinan Diamond Mine, Finsch Diamond Mine, Koffiefontein Diamond Mine and Kimberley Ekapa Mining Joint Venture diamond mines.

Legislation

All the laws/legislation (as listed above) applicable to different spheres of intelligence activities and security practices need to be observed by Cullinan Diamond Mine and its security personnel. But more importantly those principles in the Constitution need to be adhered to. During interviews with all respondents it was discovered that all application legislation to the practice of security at the mines are adhered to and these include:

- Criminal Procedure Act No 51 of 1977;
- Diamonds Act No. 56 of 1986 as amended by the Diamonds Amendment Act No. 10 of 1991 (Sections 18, 19, 20 and 21);
- National Strategic Intelligence Act 1994;
- Regulation of Interception of Communications and Provision of Communication Related Information Act (No. 70 of 2002);
- Protected Disclosure Act (No. 26 of 2000;
- Protection of Information Act 1982 (No. 84 of 1982);
- Protection of Personal Information Act (No. 4 of 2013) (known as the POPI Act);
- General Intelligence Law Amendment Act (No. 66 of 2000);
- Labour Relations Act 66 of 1995;
- Interception and Monitoring Act (No. 127 of 1992);
- Promotion of Access to Information Act (No. 2 of 2000);
- Private Security Industry Regulation Act, 2001 (Act 56 of 2001); and
- Hazardous Substances Act (No. 15 of 1973).

Chapter 2 of the Constitution of the Republic of South Africa (1996) enshrines certain rights to all people of South Africa which need to be respected and abided by. The rights which the security intelligence and Security Department must guard against in the executing of their functions includes:

- Arrest, detain of the accused persons;
- Access to courts of the arrested person;
- Just administrative action;
- Access to information by the arrested person;
- Labour relations;
- Freedom of expression;
- Privacy, respect the privacy of all employees;
- Freedom and security of the person;
- Life;
- Human dignity; and
- Equality

The use of intelligence activities in the country, both by government and the private sector, including the Cullinan Diamond Mine, is guarded by the constitution and other relevant legislation.

In Chapter 2, of the Constitution of the Republic of South Africa (1996) the Bill of Rights, protects all people from the abuse of authority by those in position of power. In implementing security measures to protect the Cullinan Diamond Mine from diamond theft, the Constitution must be observed to ensure that the company does not find itself on the wrong side of the law.

Other legislation that impacts on the activities of the security personnel and the gathering of intelligence information and general security need to be borne in mind (as listed above in Chapter 3).

Policies and procedures

Policies and procedures are but one of the attempts which any company needs to have in place to manage security. Weaknesses or gaps in the security policies and procedures need to be constantly identified or monitored and responded to accordingly (regular risk analysis and testing of security systems and measures in place).

Security intelligence relations with other stakeholders

The intelligence collection team must have regular engagements with various departmental heads on the mine. These regular engagements must be aimed at building common understanding for the security intelligence to function properly and to enhance the value which could be derived from the use of the function. Actions must also be aimed at continuously educating the customers of the intelligence function and the role which the intelligence collection team could play in their respective departments.

Intelligence-led solutions

The Security Department at Cullinan Diamond Mine should adopt an intelligence-led and technological solution approach in the prevention of diamond theft at Cullinan Diamond mine. The approach means that the intelligence product must be used as a launching pad for the implementation of security measures and preventing of diamond

theft. Intelligence-led information must be used as a centre point for policy formulation for the Security Department and placement of cameras in order to address the challenge of diamond theft. The Security Department must be more pro-active in preventing diamond theft rather than being reactive and trying to make arrests after the fact.

The Security Intelligence section at Cullinan Diamond Mine must consider adopting the target-centric approach rather than the traditional intelligence cycle to ensure that the customers/users of the intelligence become part of the process of producing intelligence. By adopting the target-centric approach, the customer, who in most cases would be the security manager at Cullinan Diamond Mine, would better understand the importance of the intelligence function provided and the implementation of recommendations would be better served as well.

The spectrum of security intelligence at Cullinan diamond mine will be mostly tactical intelligence and operational intelligence, although this could also from time to time cover strategic intelligence. Clark (2010: 51) states that tactical intelligence operates at the front line of any conflict, in this regard the researcher believes that security intelligence at Cullinan Diamond Mine must identify threats both from within and outside of the mine and bring these under the attention of the security manager for action.

Operational intelligence focuses on the capability and intention of the adversaries and potential adversaries Clark (2010:51). In this regard the researcher believes that the security intelligence function as Cullinan Diamond Mine should understand the modus operandi of any syndicate identified within the environment. The security manager at Cullinan Diamond Mine must be briefed about any modus operandi detected to ensure that the Security Department respond accordingly.

Strategic intelligence deals with long-rage issues which include national strategy, policy, monitor the international situation, trade policies or national industrial policymaking Clark (2010:50). In this regard the researcher believes that the security intelligence function must be able to support management decision and policies through understanding national and international security threats which could impact

on security at Cullinan Diamond Mine. The threats and changes identified through security intelligence will ensure that the Security Department at Cullinan Diamond Mine remains ahead of criminals.

Intelligence collector

Collectors of information within must be well familiar with the diamond value chain, so that they are able to better task their human sources. The collector of information must be well informed about the risks within the diamond value chain to enable them to enhance the accuracy of information which in turn will assist the analyst.

It is important to ensure that information collected is credible and reliable and corroborate before it is used (Flynn, 2009: 76). The collectors of information must be able to brief and debrief human sources suitably, to ensure that the circle of confirmation of correct information is shortened.

Working relations between various functions within the security department

The security manager at Cullinan Diamond Mine must have a very close working relation with the intelligence section. A healthy relationship between the security manager and the intelligence section will assist in the effort of being intelligence-led and in the prevention of diamond theft. A good relationship between the plant security personnel and the security intelligence is very important in that it will assist in identifying loops or challenges which requires intelligence information.

A good working relationship between various functions on the mine could assist security intelligence to increase its effectiveness on mine. Through a good working relationship, all employees at Cullinan Diamond Mine would be able to communicate suspicious acts freely with intelligence operators on the mine.

A relationship of trust between security intelligence and other departments on the mine, must be prioritised.

Cullinan Diamond Mine currently uses the IP surveillance system. However, a very closely co-ordinated effort between intelligence section and the security manager could add more benefit from the system. Intelligence collection must identify areas

which are exploited or could possibly be exploited and assist in identifying risk areas where cameras could be installed for monitoring. Through this co-ordinated effort between the security manager and intelligence section security measures could be more intelligence-led.

Security data analyst

A target-centric approach is recommended for Cullinan, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines, as opposed to the traditional intelligence cycle. The target-centric approach will allow stronger relations between various stakeholders on the mine and the security intelligence function. The Target-Centric approach process is more inclusive of the consumer of intelligence Clark (2010:13).

All the information collected, which includes information reports from intelligence collectors, security incidents logged, production incidents logged and anonymous tip-offs by employees, must be analysed objectively by the security data analyst. The security data analyst must guard against falling into the trap of biases and preconception.

The security data analyst must have regular meetings with the mining manager and processing manager. These meetings will inform the analyst of challenges experienced in the diamond value chain which intelligence is required for. The security data analyst must then be able to guide the collection of information process. The security data analyst must be the link between investigation and intelligence collection.

The security data analyst must have a direct link with the customer of intelligence, which will assist in clarifying elements of concern for the customer where needed and get further instructions for intelligence gathering where necessary.

Including the consumer of the intelligence in the process of analysis will assist in the implementation of intelligence in that the customer will better understand the intelligence produced. By involving the customer in the analysis process will also assist the Security Department in being more intelligence driven in measures implemented, which ultimately will lead to intelligence-led solutions being implemented.

The security managers at Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines require intelligence in order to manage diamond theft better. Clark (2010:13) states that a Target-Centric Approach involves all role players who require intelligence for decision making. The target-centric approach requires that the producer of intelligence involves the consumer of intelligence from the beginning of the process. The purpose of involving the consumer of intelligence from the onset ensures that the consumer understand the importance of the intelligence and how to implement it without compromising intelligence. This approach will also ensure that the consumer of intelligence feels trusted and avoid refusal to implement intelligence. The researcher believes that this process would also lead to quicker decisions being taken where the need exists in terms of security matters or policy matters.

Police

The relationship between the SAPS and the security intelligence team at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines needs reviewing. Only through a healthy relationship with the SAPS, will the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines benefit through the police support in addressing diamond theft.

In this regard, regular meetings, workshops and seminars with various branches of the South African Police Services are required to build a stronger relations. During these workshops or meetings stakeholders must share challenges experienced and solutions be explored to resolve these challenges. Follow-up meetings on solutions agreed upon must be held to check on progress made. Police members supporting the diamond mine industries must be taken on a tour of the diamond mining environment both surface and underground in order to get a first-hand experience of challenges relating to the protection of diamonds. Team building session between the supporting South African Police Service and the security teams of the diamond mine industries must be considered which will strengthen relation. The diamond mine industry must also assist in providing the supporting police teams with training on the identification of diamonds which will help during operations lead by the police.

Security officers

The security personnel's' skills levels at Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines regarding the diamond value system and understanding of risks, must be reviewed. The skills levels of the security personnel at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines in ways to capture incidents on the electronic data base must be addressed, in order to assist the security data analyst in producing accurate intelligence information. Inaccurate information loaded onto the system will result in inaccurate intelligence information provided.

The Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines must investigate programmes aimed at equipping operators of cameras on site with high standard skills and an understanding of the diamond value risks. Only through a better understanding of risks within the Diamond Value Chain would the Security Department be able to prevent diamond theft (Respondents No. 3, 6, 8,10, 11 & 12, 2016; Nos.14,15 & 20, 2017).

Technological solutions

Although the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines have several technological systems in place such as CCTV, Xscann and alarms, there is a need to also invest in other technological systems available on the market to prevent diamond theft (Respondent No. 12, 2016).

Drones

Currently, Cullinan Diamond Mine does not make use of drones, however, this technological capability could benefit the mine, given the vast areas the Security Department is expected to cover during patrol duty. The use of drones at Cullinan diamond mine, could assist the security manager to monitor breach of perimeter fences or monitor employees who would try and get closer to the perimeter fences unauthorised.

The use of drones on the mine could also assist and form part of the strategies of preventing diamond theft on the mine. The security personnel at the Cullinan Diamond mine have a large area to cover, using vehicles in order to monitor possible breaches

of fences. It is therefore impractical, given the number of vehicles used by the security, personnel and the size of the area to cover to conduct effective patrols. The use of drones on the mine could not only assist in the prevention of diamond theft, but also prevent copper cable theft and any other illegal act on the mine.

The use of drones must comply with the South African Civil Aviation Regulation Part 101.01.4 which regulates the use of drones for private use (Flying Robot, [sa]: np).

CCTV cameras

In this research study, data collected from CCTV cameras must be properly logged and accurately captured in order to assist in intelligence-led solutions. According to Corkill (2016: 13), the real value of surveillance is only realised when it collects data for evidence, but also when it analyses data in real time to provide intelligence.

Xscann

The viewer of Xscann must have the skills to be able to detect foreign objects on the body. Currently several operators of the Xscann system are not skilled to operate the system which exposes the security system to criminal elements.

An up-to-date register of all trained security officials to operate the system must be kept and a refresher programme must be done once a year. Collusion between security officials and general employees renders any security technology measure worthless. In order to counter this threat, intelligence-led solutions must be provided by the intelligence function (Respondent Nos. 3, 6, 8, 10 & 12, 2016; Respondent Nos. 14,15 & 22, 2017).

Source network

Intelligence collectors must enhance its information collection efforts in order to uncover plans of collusions between the security personnel and plant employees. Intelligence sources must be educated on the diamond value system in order to assist on the accuracy of the information received regarding the process. The education received on the process will also assist intelligence sources to better identify risks and suspicious behaviour within the process. Intelligence collectors do not only assist the security manager in preventing diamond theft, but also assist in prevention of theft

generally on the mine. The customers of intelligence could not necessary be those within the diamond value chain, but any other person could use intelligence for decision making (Respondent Nos. 2, 3, 7 & 8, 2016; Respondent Nos. 24 & 29, 2017).

Security awareness

A security awareness programme must be put in place by the security manager at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines. The awareness programme must continuously remind employees of the negative impact of diamond theft to the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines and how they can report illicit acts to the security department. The awareness programme must also include communities in the immediate environment of the mine, to also encourage them to report acts of diamond theft (Respondents Nos. 1-13, 2016; Respondent Nos. 14-30, 2017) agreed that security awareness is an important tool that security must use to conscientise employees about what is allowed and not).

Investigation

Investigation at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines must maintain the current relation with the intelligence collection function as it has proven to be working very well. The analyst must link up intelligence collections and investigations through tasking of cases still coming.

Anonymous tip-off line

The anonymous tip-off line must be advertised more to the employees, because at this stage it is clear from the responses that not all employees know the platform of reporting criminal activities.

Policies and procedures

It is very important that employees must understand the policies and procedures around security matters. Security awareness around new or updated policies should be done monthly.

5.3 CONCLUSIONS

The current security measures in place at the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines assist in the prevention of diamond theft, however these measures must be synchronised in order to add more value both to the security department, production and ultimately the company bottom line profit.

The Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines currently make use CCTV camera technology as one of the solutions to prevent diamond theft on the mines. Several areas on the mines are currently covered with CCTV cameras which include access points to specific areas, monitoring of the red, pink and blue areas. There are areas such as tailing dumps and conveyor belts which are not covered by cameras and which could be exploited by employees for theft of diamonds.

A closely co-ordinated effort between the intelligence section and the security manager at Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines could further assist in identifying areas which could be exploited, or which are being exploited for diamond theft. The use of security technology could be extended to other areas within the diamond value particularly underground with the purpose of preventing unauthorised searching for diamonds by employees. The intelligence field of study has a rich history of successes both internationally and locally in preventing criminal acts as indicated by several authors in the literature review.

A diamond value system involves a multidimensional process, each process with its own challenges and risks. Employees in the diamond value system will in one way or the other get into contact with diamond-bearing material during their daily activities. Although the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines have measures in place to prevent diamond theft, in order for them all to successfully prevent diamond theft, security measures should be put in place by the security manager, which must be intelligence-led. The security intelligence section plays a very critical role in the diamond value system. These roles include, namely:

- Informing on company strategic decisions;
- Informing operational decisions on the mine;
- Tactical decision on the mine;
- Informing on production trends which could lead to production loss;
- Informing on threats detected from security incidents;
- Informing on security measures to be implemented to prevent diamond theft;
- Informing on security operations aimed at preventing diamond theft and any other theft on the mine;
- Informing on external threats to the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines, which could affect the company negatively; and
- Informing on illicit diamond theft activities outside which have a negative impact on the existence of the company.

The intelligence analyst must engage intelligence customers, first to understand their requirements and then to ensure that the feedback given to the customer is understood by the customer and that it is implemented. The customer of the analyst includes the security managers of the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines; the security diamond manager of Petra Diamonds; the plant manager of Cullinan Diamond Mine; the mining manager of Cullinan Diamond Mine; and any other customer who might require intelligence in order to execute their duties.

More benefits could be derived by the Cullinan, Finsch, Koffiefontein and Kimberley Ekapa Mining Joint Venture diamond mines by using security technology-based solutions and intelligence-led solutions only if the two tools are well coordinated by the

security manager and the intelligence collection team. The newest technology must be used as one of the sources of information gathering for the intelligence function and not stand-alone security measures.

The competency level of the personnel or operators of the security technology team must be evaluated, if the Security Department is to benefit from the technology. During the interviews, Respondent No. 7 (2016) indicated that the security personnel working at the diamond value chain need to understand the risk in the process for them to be able to prevent diamond theft. In this study one cannot protect something which you do not know and therefore the skills levels of the security personnel need to be of a high standard.

The information on the placement of the cameras at the mines must be given to the risk assessment and intelligence team, in order to see return on investment, because randomly placing of cameras could amount to wasteful expenditure.

The use of Scannex or Xscann in a diamond mine is important as seen from the cases studies highlighted, because through this technology, security would be able to detect employees carrying foreign objects on their bodies. Once more, the viewer of the X-ray must have the skills to be able to detect foreign objects on the body.

In this research study, formed by working experience over 12 years at Cullinan diamond mine, the researcher's view is that collusion between the security intelligence team and employees could render any technology worthless. It is therefore important that intelligence-led solutions must be provided by the intelligence collection team, in order to counter this threat.

Cullinan diamond mine currently uses the Xscann system to prevent diamond theft from the red area. The system operators' skills levels need therefore to be evaluated to determine if it meets the required standard in order to derive value from the security measures put in place.

The Cullinan Diamond Mine must consider technologies as highlighted in the text and which are not currently in place, in order to assist in the prevention of diamond theft throughout the diamond value systems.

The findings and recommendations of this study can be used in other Petra diamond operations and any other diamond mine in South Africa.

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Cullinan Diamond Mine. 2008. CDM-SEC-20. X-ray scan operating procedures

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Cullinan Diamond Mine. 2008. CDM-SEC-08. Surveillance

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INTERVIEWS

Interview No. 1. 2016. Geotechnical Manager. Cullinan Diamond Mine. 1 March.

Interview No. 2. 2016. Engineering manager. Cullinan Diamond Mine. 2 June.

Interview No. 3. 2016. Security Investigation Coordinator. Cullinan Diamond Mine. 03 March.

Interview No. 4. 2016. Miner. Cullinan Diamond Mine. 11 May.

Interview No. 5. 2016. Sort House Sorter. Cullinan Diamond Mine. 04 March.

Interview No. 6. 2016. Security Data Analyst. Petra Diamonds. 17 March.

Interview No. 7. 2016. Security Manager Product. Petra Diamonds. 2 March.

Interview No. 8. 2016. Surface Manager. Cullinan Diamond Mine. 6 May.

Interview No. 9. 2016. Plant Operator. Cullinan Diamond Mine. 24 May.

Interview No. 10. 2016. General Manager. Cullinan Diamond Mine. 26 April.

Interview No. 11. 2016. Diamond Processing Foreman. 28 April.

Interview No. 12. 2016. Security Intelligence Manager. Petra Diamonds. 15 April.

Interview No. 13. 2016. Security Plant Leader. Cullinan Diamond Mine. 18 March.

Interview No. 14. 2017. Plant Section Foreman. Cullinan Diamond Mine. 9 May.

Interview No. 15. 2017. Plant Section Foreman. Cullinan Diamond Mine. 9 May.

Interview No. 16. 2017. Safety Officer. Cullinan Diamond mine. 9 May.

Interview No. 17. 2017. Plant Foreman. Cullinan Diamond Mine. 17 May.

Interview No. 18. 2017. Mine Overseer. Cullinan Diamond Mine. 17 May.

Interview No. 19. 2017. Bourevestnik (BV) X-ray Controller. Cullinan Diamond Mine.19 May.

Interview No. 20. 2017. Plant Security Officer. Cullinan Diamond Mine. 20 May.

Interview No. 21. 2017. Sort House Controller. Finsch Diamond Mine. 19 October.

Interview No. 22. 2017. Plant Superintendent. Finsch Diamond Mine. 19 October.

Interview No. 23. 2017. Mine Overseer. Finsch Diamond Mine. 18 October.

Interview No. 24. 2017. Senior Security Officer Risk. Finsch Diamond Mine.16 October.

Interview No. 25. 2017. Miner. Koffiefontein Diamond Mine. 17 October.

Interview No. 26. 2017. Shaft and Production Mine Overseer. Kimberley Ekapa Mining Joint Venture. 17 October.

Interview No. 27. 2017. Security Intelligence Coordinator. Kimberley Ekapa Mining Joint Venture. 17 October

Interview No. 28. 2017. Security Investigation Coordinator. Kimberley Ekapa Mining Joint Venture.10 October.

Interview No. 29. 2017. Security Manager. Kimberley Ekapa Mining Joint Venture.18 October

Interview No. 30. 2017. Recovery Plant Supervisor. Koffiefontein Diamond Mine. 20 October.

Annexure A: UNISA Ethics Approval Letter

UNISA college of law

COLLEGE OF LAW RESEARCH ETHICS REVIEW COMMITTEE

Date: 26-10-2015

Reference: St 91

Applicant: MD Nek

Dear Mr Nek

DECISION: ETHICS APPROVAL

Name	MD Nek
	Combatting diamond theft through intelligence-led and technology-based solutions: A case study Cullinan Diamond mine (PTY)Ltd. Gauteng, SA
Qualification	M Tech Security Risk Management

Thank you for the application for research ethics clearance by the College of Law Research Ethics Review Committee for the above-mentioned research. Final approval is granted.

The application was reviewed in compliance with the Unisa Policy on Research Ethics.

The proposed research may now commence with the proviso that:

1. The researcher will ensure that the research project adheres to the values and principles expressed in the Unisa Policy on Research Ethics which can be found at the following website:

University of South Africa
Preller Street. Muckleneuk Ridge. City of Tshwane PO Box 392.
Unisa. 0003. South Africa

http://www.unisa.ac.za/cmsys/staff/contents/departments/res_policies/docs/Policy_Research%20Ethics_rev%20app%20Council_22.06.2012.pdf

2. Any adverse circumstances arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the College of Law Ethical Review Committee.
3. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants
4. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.

Note:

The reference number (top right corner of this communique) should be clearly indicated on all forms of communication (e.g. Webmail, E-mail messages, letters) with the intended research participants, as well as with the URERC

Kind regards

DR B HAEFELE
CHAIR PERSON: RESEARCH ETHICS REVIEW COMMITTEE
COLLEGE OF LAW

PROF R SONGCA
EXECUTIVE DEAN:
COLLEGE OF LAW

Annexure B: Turnitin Similarity Index Report

Turnitin Originality Report

- Processed on: 28-Feb-2019 12:07 SAST
- ID: 1085294251
- Word Count: 24 615
- Submitted: 1

COMBATING DIAMOND THEFT THROUGH INTELLIGENCE-LED AND TECHNOLOGY-BASED SOLUTIONS: CASE STUDY CULLINAN DIAMOND MINE, SOUTH AFRICA

By Mbulelo David Nek

Similarity Index
5%

Similarity by Source

Internet Sources: 5%

Publications: 1%

Student Papers: N/A

Annexure C: Letter of Consent: Petra Diamonds

PetraDiamonds

To:	To whom it may concern
Originator:	Gerry Nel – Security Intelligence Manager: Petra Diamonds SA (Pty) Ltd
Date:	26/05/2015
Topic:	Letter of consent to continue with MTech: Security Risk Management – Mr Mbulelo David Nek

Dear Sir/Madam

This is to confirm that Petra Diamonds (Pty) support and approve the topic submitted by Mr Mbulelo Nek
"Combatting of diamond theft through Intelligence-led and technology-based solutions" and that Cullinan Diamond Mine (Pty) Ltd is used as a case study as part of the topic.
Yours sincerely

Gerry Nel
Security Intelligence Manager
Petra Diamonds Southern Africa (Pty) Ltd

Annexure D: Language Editor Letter

Dr Cherita Morrison

[BA BA(Hons) MA DLitt et Phil (Criminology)]

2 Chardonnay, Louise Harris Crescent

Meyersdal 1448

Cell: 071 470 4597 **E-mail: cherita@morrison.co.za**

TO WHOM IT MAY CONCERN

This letter serves to inform you that I have done language editing on the following dissertation:

Name:	**M.D. Nek**
Student no.:	**36895016**
Qualification:	**MTech Security Management**
Title:	**COMBATING DIAMOND THEFT THROUGH INTELLIGENCE-LED AND TECHNOLOGY-BASED SOLUTIONS: CASE STUDY CULLINAN DIAMOND MINE, SOUTH AFRICA**
No of pages:	**81**

CJ Morrison

21 February 2019

Annexure E: Interview Schedule of Questions

INTERVIEW SCHEDULE OF QUESTIONS: MEMBERS OF ……[DIAMOND MINE]

A. BIOGRAPHICAL DATA QUESTIONS

1. What are your full names, surname and ID no?

2. What is your home language?

3. What language would you prefer for the purpose of the interview?

4. What section/department are you employed in at [Cullinan] Diamond Mine?

5. What is your current position at [Cullinan/other mine name] Diamond Mine?

6. What does your duties and role entail at [Cullinan/other mine name] Diamond Mine?

7. How many years of service do you have in your current section/department?

8. How many years of service do you have at [Cullinan/other mine name] Diamond Mine?

9. What is your highest educational/training qualification?

10. What is your working experience at [Cullinan/other mine name] Diamond Mine?

B. RESEARCH STUDY QUESTIONS

1. What value has the use of informers has had in preventing diamond theft?

2. Please explain your process and how it fits into the diamond value chain?

3. Please explain the technical challenges experienced in your processes applicable to the diamond value chain?

4. Please identify vulnerabilities you think may contribute to diamond theft during your processes.

5. Do you think that competency plays a role in preventing diamond theft in your section?

6. Do you think that engineering design plays a role in preventing diamond theft in your section? If so why?

7. Please tell me about operational and security procedures in your section directly applicable to diamond security you may be aware of?

8. Which process in your section requires or results in employees coming into direct contact with Ore material or concentrate?

9. How often does the contact with Ore material or Concentrate material occur in a shift?

10. Explain what data/information is captured in you section.

11. Explain how and when your data/information is captured, analysed and disseminated. Include process and systems used to capture such data/information.

12. Explain the process followed in recording and addressing instances where your diamond value chain processes have resulted in contact with Ore material or concentrate.

13. In your years of service or years or experience in the section have you ever seen an unpolished diamond or an object which appeared to be a diamond?

14. In your years of experience within the section have you ever seen an employee scratching in the Ore material or Concentrate material, and if so, what action was taken?

15. With your years of experience which part of the process in the section poses the biggest risk of diamond theft and how do you manage this process?

16. Do you think that employees in the section are aware or well informed about the toll-free crime line for reporting suspicious behaviour or theft of diamonds on mine?

17. Do you think that the current systems in place of rewarding employees for diamond pick-ups is encouraging employees to report more pick-ups? If not, what more can be done in your opinion?

18. What systems do you use to record crime incidents on mine?

19. How is your crime incidents data and information from anonymously sources handled?

20. Do you believe that crime incidents and trends recorded assist in the prevention of diamond theft? If not, why?

21. How has information reported anonymously assisted security in the prevention of diamond theft?

22. What process is used to verify information from various sources with regards to diamonds theft?

23. What processes are used to ensure that the company prevents criminals from infiltrating the system?

24. What security controls are in place in the diamond value chain to prevent unauthorised scratching in concentrate material?

25. Has intelligence received assisted in the preventing of diamond theft? If not, what more could be done to improve the situation?

THANK YOU FOR YOUR PARTICIPATION IN THIS INTERVIEW FOR MY RESEARCH STUDY

ANNEXURE F: DOCKET ANALYSIS PRO FORMA USED FOR DOCKET ANALYSIS

MINE [CDM]	SAPS CASE NO.	DAY	TIME	LOCATION	PRODUCT	VALUE	NO. OF SUSPECTS	EMPLOYEE/ CONTRACTOR	COMMENTS